InRoads Geometry for ROW and ROW Plan Development Using MicroStation

Course Curriculum

Revised: January 2010

Duration:

Two days

Prerequisites:

Prerequisite courses are:

- ***MicroStation Essentials*** or work experience with MicroStation drafting tools
- ***InRoads Geometry Fundamentals*** or work experience with InRoads geometry tools
- ***Using InRoads Survey for Data Reduction*** or work experience with **InRoads Survey**, coordinate geometry, and alignments

Course Objectives:

This course provides training on additional InRoads tools specific to the workflow for developing ROW/Survey geometry, building upon the tools and techniques of developing geometry taught in the InRoads Geometry Fundamentals course. These additional InRoads geometry tools facilitate the development of land parcel information and aid in the development of geometry for the right-of-way process.

Students will also receive training in the development of alignment diagrams and right-of-way plats. These additional tools equip surveyors in the development of documents for the right-of-way plat process.

This course will address:

- Creating geometry entities
- Creating parcels, parcel closures and generating parcel descriptions
- Creating ROW specific plan sets

In addition to covering key features and geometry tools of InRoads XM, other course objectives include:

- Gaining an understanding of relationship and interaction of exporting InRoads Survey data to InRoads Geometry data files
- Development of InRoads geometry using various techniques such as cogo points, alignments, and parcels
- Development of property information for the generation of right-of-way plans
- Hands on practice generating geometry annotation, efficient use of MicroStation reference files, and automation of placing tabular/textural data in plan sheets

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.

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 InRoads XM***. Students may be asked to refer to ***A Practical Guide for Using InRoads XM*** during the lecture portion of the class for detailed explanations of how to use specific InRoads commands and to gain an understanding of the command options.

CDOT Standards:

This course uses all CDOT standard configuration files, including the new standard CDOT_Civil.xin and template library files.

Class Schedule and Objectives

DAY 1

1. **Getting Started in ROW Geometry and Plans – 0.5 hour**

   This lab demonstrates how to start the InRoads and InRoads Survey applications. Be sure to check the setup of InRoads to verify the correct standard resources are being used. The following concepts will be covered:

   - Launching InRoads and InRoads Survey
   - Setting up Project Defaults to work with the ROW Survey group

   Lab: Getting Started in ROW Geometry and Plans

2. **Working with Survey Data - 0.5 hour**

   This lab demonstrates working with survey data as a foundation for the initial geometry. Exporting the survey fieldbook to an InRoads geometry project will generate alignments along linear items and cogo points at all survey shot locations. The following activities will be completed:

   - Load existing survey data
   - Use the survey data filter tool to select only points and alignments that will be needed for right-of-way design

- Export the filtered survey data to a geometry project as cogo points and horizontal and vertical alignments

Lab: Working with Survey Data

3. **Geometry Projects - 1 hour**

This lab demonstrates opening and viewing geometry projects using InRoads and MicroStation. Students will learn how to copy geometry data such as horizontal alignments from one geometry project to another. In this lab the student should learn how to:

- Open an existing geometry project
- View data stored in the geometry project including horizontal alignments and cogo points
- Manage and copy geometry between projects

Lab: Geometry Projects

4. Working with Cogo Points - 2 hours

The InRoads Cogo Buffer stores all cogo points. This section demonstrates how to use the cogo buffer to create, manage, review, and manipulate cogo points. Students will learn the following concepts related to cogo points:

- Various methods of creating cogo points including graphically and inputting coordinates
- How to use geometry to create cogo points from geometry vertices and intersection commands
- Using cogo points to create, copy and modify alignments including parallel and offset alignments and parcels

Lab: Creating Cogo Points

- The relationship between alignment vertices and cogo points
- Create cogo points from a horizontal alignment
- How to manually or automatically assign cogo point names

Lab: Alignment to Cogo Buffer

- Reviewing cogo points stored in the cogo buffer using the feedback pane of the InRoads interface
- Exporting cogo point data text file

Lab: Reviewing Cogo Points

- Locate a precise geometry point using various geometry snap tools such as No Snap and Point Snap from the Locks toolbar
- Illustrate how the snap tools are used in conjunction with the inverse direction and traverse tools or other geometry related commands

Lab: Geometry Snaps

- How to create cogo points using direction and bearings key-ins

Lab: Cogo Point by Traverse

5. **Creating Alignments - 0.5 hour**

   This section will expand on previous training to create alignments by chaining cogo points together. This methodology is commonly referred to as the "PI Method" and will utilize the ***Geometry*** > ***Horizontal Curve Set*** tools. Key topics included in this section include:

   - Create an alignment using a combination of the ***Geometry*** > ***Horizontal Curve Set*** tools, cogo points, and the ***Geometry Point Snap*** lock
   - Emphasis will be given to creating an alignment using cogo points stored in the cogo buffer and points on an alignment

   Lab: Horizontal Alignments from Cogo Points

6. **Intersections and Parcels - 2.5 hours**

   Development of right-of-way information can be facilitated by creating cogo points using cogo intersection commands. These cogo points can in-turn be used to define alignments (parcels). Another method is to create cogo points and alignments simultaneously. Parcels are alignments that form a closed boundary. Students will learn how to create new parcels from existing parcels and crossing alignments. Topics in this section include:

   - Create cogo points through various intersection commands
   - Generate alignments from cogo points

   Lab: Cogo Intersection Commands

   - Create a closed alignment using cogo points and various intersection commands

   Lab: Creating a Closed Alignment

   - Use a deed and the Traverse Edit add-in application to create a closed parcel

   Lab: Parcel Creation by Deed

   - Create parcels used for right-of-way acquisition from existing parcels and alignments

   Lab: Right of Way Parcels

   - Annotate alignments and parcels

   Lab: Annotation of Closed Parcels

7. **Reports - 0.5 hour**

   This section covers how to generate legal descriptions for parcels. A legal description is a specific report available through the InRoads Report Browser. InRoads reports use a combination of data in an XML format and predefined layouts called style sheets (excel files). In this section the student will learn how to:

   - Create a legal description for parcels

   Lab: Parcel Descriptions

8. **Additional Exercises - as time allows**

   Topics covered in the following exercise include:

- Import cogo points from graphics, ASCII, and ICS

Lab: Importing Cogo Points

Students will learn the how to set the project geometry parameters for desired results.

- Setup InRoads options such as units, format, precision, tolerances, etc. to control desired input and output of design data

Lab: Geometry Options

Regression analysis can be used to facilitate the development of horizontal alignments by creating a 'best-fit' alignment through defined points. Students will learn how to:

- Setup parameter used for horizontal regression analysis

Lab: Horizontal Regression Analysis

DAY 2

Day 1 Review - 0.5 hour

9. Working with MicroStation - 2.5 hours

In this section students will learn the methodologies for generating ROW specific MicroStation files to be used in generating a plan set. In the process of generating these files, the following topics will be covered:

- Using the correct workspace to open the Title Sheet
- Place the RLS stamp on the Title Sheet at the correct scale

Lab: Creating Files and Placing Cells

- Editing text on the title sheet to be project specific
- Add labels and additional titles

Lab: Editing Text

- Reference county map into the Title Sheet
- Constrain the display limits of Vicinity Map reference files using clip boundaries

Lab: Vicinity Map - Vector

- Adding a locator map to the Title Sheet
- Constrain the display limits of Locator Map

Lab: Locator Map

- Use the CDOT Menu to annotate the Title Sheet

Lab: Annotation

10. Generating Sheet Files - 5 hours

This section illustrates how to produce various type of ROW specific plan sheets using data from Microsoft Excel and Word. Students will learn how to use InRoads to automatically generate plan sheets already setup to the correct scale and with the correct reference file attachments. This section will instruct the student how to:

- Export InRoads cogo points to XML
- Use XML data in an Excel spreadsheet
- Link the spreadsheet to a MicroStation file to complete a land survey control diagram plan sheet.

Lab: Land Survey Control Diagram Plan Sheet

- Use XML Reports to generate the Tabulation of Properties Sheet and parcel descriptions

Lab: Tabulation Properties Sheet

This lab will relocate the border sheet to align with the design graphics.

- Modify plan sheet by adding reference files, adding reference file clipping boundaries, and rotating reference files to align the border sheet with the design graphics

Lab: Reference Files for Plan Sheets

- Create plan sheets using Plan and Profile Generator
- Edit reference file clipping boundaries

Lab: Project Specific Plan Sheets