CivilTraining, LLC
a DAVEY company

Terrain Modeling, Contouring and Analysis in AutoCAD Civil 3D – 4.0 Hours

Workshop Description

Summary

This class, offered at selected survey conferences, examines the creation of Digital Terrain Models, or Surfaces, in AutoCAD® Civil 3D®, with an emphasis on producing highly-accurate models as efficiently as possible from survey data. Since the Civil 3D Surface is also the basis for contouring and analysis within the program, better surfaces yield better contouring and analysis as results.

The class reviews the data types for terrain modeling – point, breakline and contour data - and how their use is facilitated with survey data transferred into the drawing from field work. The class will examine how breakline data can be captured and included in the Civil 3D TIN, using not only Civil 3D tools but from other solutions, including Carlson® and SmartDraft®. The course will examine various strategies for filtering point data for inclusion in the Civil 3D Surface, including Point Groups, Description Keys and other tools. Major topics also include the assessment of surface accuracy and surface editing, techniques for improving the quality of contouring, surface presentation and annotation styles, and the use of surfaces in analysis functions, such as slope and drainage assessment.

Topics and Schedule

Digital Terrain Modeling (DTM) Concepts Overview

Basic Concept - Interpolation
DTM in Civil 3D Introduction
Operational Aspects of Civil 3D Introduction
- Processing Data
- Building a Civil 3D Object

Data Types Used in Constructing DTM

Point Data
Breakline Data
Contour Data

Critical Civil 3D Surface Feature Settings

Civil 3D – Infinitely Customizable Program (Advantage and Disadvantage)
Settings Control Each Feature or Element
Critical Surface Feature Settings
Examining Surface Feature Settings
Importance of Surface Default Style
Surface Command Settings
Triangulated Irregular Networks (TINs) Versus Grid Models
Building a Surface from More than One Data Type in Civil 3D
Producing TINs with Exceptionally High Quality

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Starting the Surface in Civil 3D
- Methods for Creating the Existing Aerial Surface
- Adding Spot Elevation Data
- Adding Contour Data
- TIN Weeding - Filtering of Vertices on Contours
- TIN Supplementing Factors - Adding Vertices to Polylines
- Options for Minimizing Flat Areas

Adding Breakline Data to the Surface
- Creating Breaklines from Drawing Information
- Civil 3D Interpolation Tool for Producing a 3D Polyline/Breakline
- Adding Breaklines to the Surface

Surface Integrity and Data Security
- Surface Editing
- Adding Boundaries to Suppress/Show/Hard Clip Data
- Processing the Boundary as a Non-destructive Breakline
- Locking to Protect from Accidental Editing

Continuing with Additional Field Data
- Creating Breaklines – and *Exception*
- Point Data Requirements
- Layer Considerations
- Isolating Display of Points for Breaklines Options
  - Point Group Display Order
  - Layer Management
- Drawing the Breaklines
- Alternative for Creating Breaklines
- Creating the Surface
- Adding Breakline Data to the Surface
- Adding Point Data to the Surface
- Adding the Surface Boundary
- Pasting Surfaces

Pasting Surfaces to Create the Existing Combined
- Copying the Aerial Surface
- Pasting the Road Sections Surface

Surface Status Indications in the Prospector

Contouring Surfaces

Surface Labeling
- Setting Styles and Creating Contour Labels
- Placing a Spot Elevation Label

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Learning Objectives

1. Participants will be able to describe the process for building surfaces in Civil 3D from survey fieldwork as illustrated using the sample survey project used in the course.

2. Participants will be able to describe surface display and annotation controls exercised by Civil 3D styles as illustrated using the sample survey project used in the course.

3. Participants will be able to describe the process for building breakline data for surface creation, either through field-to-finish processing or manual construction within a drawing, as illustrated using the sample survey project used in the course.

4. Participants will be able to describe methods for assessing surface accuracy and performing surface editing as illustrated using the sample survey project used in the course.

TERRAIN MODELING, CONTOURING AND ANALYSIS IN AUTOCAD CIVIL 3D – HALF DAY

Overall Course Length	4.0 Hours
Instructional Time	3.5 HOURS

PROFESSIONAL DEVELOPMENT HOURS (PDHS)

New York State Land Surveyors	3.5 PDHs
New York State Professional Engineers	3.5 PDHs

This course is a registered Continuing Education class with the AIA. Courses taught by CivilTraining, LLC meet continuing education/professional development requirements for Alabama, Delaware Professional Engineers, Georgia, Illinois, Kentucky, Michigan, Missouri, Nevada, New Mexico, Ohio, Pennsylvania, South Carolina, Tennessee Professional Engineers, Texas Professional Engineers, Utah, Virginia, and West Virginia. CivilTraining, LLC is an approved Florida Board of Professional Engineers Continuing Education Provider for Area of Practice courses. CivilTraining, LLC, License No. CE84, is an approved Continuing Education Provider by the Florida Board of Professional Surveyors and Mappers; this continuing education course, number 8526, is approved for 4.0 general continuing education credit. The Indiana State Board of Registration for Professional Engineers has approved this course for continuing education. CivilTraining, LLC is an approved Land Surveyor Continuing Education Provider by the Indiana State Board of Registration for Land Surveyors Professional Licensing Agency and a provider of Continuing Professional Competency (CPC) requirements for Maryland Professional Engineers and Land Surveyors, approved by the Maryland Boards for Professional Engineers and Land Surveyors. CivilTraining, LLC is an approved provider of Continuing Professional Competency courses for New Jersey Professional Engineers by the New Jersey State Board of Professional Engineers and Land Surveyors, and this course has received approval for Continuing Professional Competency for Continuing Education of Land Surveying by the New Jersey Board of Professional Engineers and Land Surveyor. CivilTraining, LLC, an approved sponsor of continuing education for Professional Engineers and Land Surveyors in New York State, NYS Sponsor #171, has received approval for the above-referenced PDHs for this course. CivilTraining, LLC is an approved sponsor for North Carolina Engineers and Land Surveyors, approved by the North Carolina Board of Examiners for Engineers and Surveyors, and the Tennessee Board of Examiners for Land Surveyors has reviewed and approved CivilTraining, LLC's training courses for continuing education. This course is approved for continuing education credits for Rhode Island Professional Land Surveyors by the Rhode Island State Board of Registration for Professional Land Surveyors.

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