

## AutoCAD Civil 3D Advanced Grading Applications – 16.0 Hours (2 Days)

### Course Description

#### Summary

Site grading in AutoCAD® Civil 3D® has been one of the most difficult applications in the program since its creation, owing to a combination of factors – complexity of the tools, relative instability of some aspects of the program and insufficient performance of early workstations and operating systems. The second and third factors have been overcome by current releases of Civil 3D and more powerful workstations running better operating systems, but complexity of the Civil 3D grading solutions remains an issue. This course demonstrates proven techniques for applying Civil 3D grading tools to easily produce desirable results, both in model and drawing form.

As an advanced level course, Civil 3D Advanced Grading Applications can be taught based on a variety of sites and project types depending on the applications and preferences of the participants. Recent courses have focused on commercial, residential and landfill applications. The course is typically a two-day program, attempting to complete a substantial portion of the grading project selected for the course, but the length can be varied to suit the requirements of the clients as well. The course focuses on grading requirements common to most projects across all applications, including entrance roads or driveways, building pads, parking lots, basins or ponds and berms, swales and brow ditches.

The objective of this course is to develop a satisfactory workflow through Civil 3D grading, producing desirable results with a minimum of effort or disruption to normal grading and design process. Successfully applied, Civil 3D grading is a means to an end, not an objective of its own.

### Topics and Schedule

#### Overview of Civil 3D Grading Solutions

- Grading Objectives – Presentation and Level of Detail
- Setting Up the AutoCAD Work Space for Grading
- The Golden Rule of Civil 3D Grading

#### Grading Best Practices in Civil 3D

- Civil 3D Grading and Drawing Stability
- Multi-Base Drawing Organization
- Grading Base Drawing Content and Uses
- Design Base Drawing Content and Uses
- Review of Civil 3D Project Management and Job Organization
- Civil 3D Project Management Importance in Grading
- Review of Civil 3D Site Concepts
- Site Definition and Site Organization within a Project

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### Analyzing Site Requirements and Determining Workflow

- Establishing Known and Ruling Site Factors
- Selecting Civil 3D Tools for Different Site Components

### Feature Line Grading Applications

- Feature Line Creation Tools and Strategies
- 3D Polyline and Feature Line Comparisons and Workflows
- Feature Line Naming, Organization and Management
- Feature Line Display Styles
- Assigning Feature Line Elevations
- Feature Line Connectivity with Alignments, Profiles and Corridors
- Feature Line Editing – Horizontal Edit Capabilities
- Feature Line Editing – Vertical Edit Capabilities
- Feature Line Advanced Tools – Elevation by Reference
- Feature Line Advanced Tools – Adjacent Elevation by Reference
- Feature Line Dynamic Links to Other Data Sources
- Profile Control of High/Low Points in Feature Lines

### Grading and Grading Groups

- Grading and Grading Group Concepts and Terminology
- Creating, Using and Deploying Grading Criteria
- Grading Display Styles
- Grading Surface Creation Options
- Grading Edits, Graphical and Tabular
- Corner Overlap Resolution with Grading and the Prevention of Bow Ties

### Building Comprehensive Grading Solutions by Combining Civil 3D Tools

- Iterative Surface Creation with Additional Features and Details
- Using the Object Viewer and AutoCAD Orbit to Check Grading
- Checking Grading with Civil 3D Quick Profiles
- Pad-to-Pad and Feature-to-Feature Grading Connectivity
- Projecting 2D Features into 3D
- Creating Retaining Walls, Headwalls and Similar Features
- Creating Berms, Swales, Ditches and Similar Features
- Grading Plan Detail versus Grading Model Detail
- Tessellation Control in Feature Lines and Grading
- Complete and Partial Grading Tools
- Extracting Data from and Connecting to Corridors
- Using Temporary Surfaces for Grading Targets and Volumes
- Volumes and Basin or Pond Capacities
- Volume-Based Iterative Design
- Disconnecting Feature Lines and Grading from their Intelligence
- Contour Grading Considerations

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### Incorporating Point Grading and Interpolation

- Point Grading Tools in Civil 3D
- Interpolation Solutions in Civil 3D
- Extracting and Using Surface Elevations with Points
- Interpolating Data and Grading on Curves

### Grading Output and Deliverables

- Data Export to a Grading Base Drawing
- Spot Elevation Labels in Civil 3D and SmartDraft®
- Volume Calculation Methods
- Volume Display Techniques – Volume Ticks
- Volume Exhibits
- Grading Export to Machine Control Software

### Prerequisites

As an advanced level class, completion of Civil 3D Essentials and Civil 3D Intermediate is normally required. Participants who have not completed these classes may attend, but complete familiarity with all Civil 3D concepts introduced in the classes is absolutely required.

### Learning Objectives

1. Participants will be able to describe the project and drawing organizational requirements for grading in the sample project used in the course.
2. Participants will be able to produce Feature Lines for site grading in the sample project used in the course.
3. Participants will be able to produce grading groups for site grading sample project used in the course.
4. Participants will be able to perform volume analysis between existing and proposed site features in the sample project used in the course.

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### AUTOCAD CIVIL 3D ADVANCED GRADING APPLICATIONS – TWO DAYS

Overall Course Length	16 Hours
Instructional Time	14 HOURS

### PROFESSIONAL DEVELOPMENT HOURS (PDHs)

New York State Land Surveyors	N/A
New York State Professional Engineers	14.0 PDHs



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