

Autodesk Certified Professional in Civil 3D for Infrastructure Design

Exam objectives

Target audience

The Autodesk Certified Professional (ACP) certification is designed for candidates who have advanced skills and can solve complex challenges in workflow and design. This type of experience typically comes from having worked with the software on a regular basis for at least two years, or equivalent to approximately 400 hours (minimum) to 1,200 hours (recommended) of Autodesk software experience. Certification at this level demonstrates a comprehensive skill set that provides an opportunity for individuals to stand out in a competitive job market.

Candidates who obtain this certification have demonstrated advanced skills in AutoCAD Civil 3D and will be knowledgeable in relevant workflows, processes, and project objectives. The candidate will have been reasonably self-sufficient and able to apply basic CAD principles using the product. They've also will have performed routine tasks involved in their job role with limited assistance from peers, product documentation, and support services. The minimally qualified candidate will have worked in collaboration with colleagues and is able to work with minimal supervision.

Prerequisite skills

It's expected that candidates will already know how to:

- Use basic AutoCAD tools such as draw and modify tools, layer management, object snaps, printing and configuring layouts, annotation tools, blocks, external references (Xrefs), and templates.
- Use the AutoCAD Sheet Set Manager to create, open, and publish sheets.
- Set up a Civil 3D project.
- Apply the appropriate coordinate system to a Civil 3D drawing.
- Apply basic theory of civil design.
- Apply basic computer skills.
- Communicate effectively with other people.

Exam objectives

Here are some topics and software features that may be covered in the exam.

1. Points, parcels, and surveying

1.1. Create points using the point creation methods

- 1.1 a Describe the difference between Survey and Coordinate Geometry (COGO) points
- 1.1 b Create COGO points
- 1.1 c Specify point parameters
 - i. May include points creation, point identity, default layer, default styles, default name format, and dropdown options from Point Creation Tools.
- 1.1 d Assign point styles and point label styles
 - i. May include point markers and description key sets.

1.2. Modify point appearance and properties

- 1.2 a Rotate point markers
- 1.2 b Manage point styles
 - i. May include specifying that the point size is determined by the drawing scale (annotative scaling).
- 1.2 c Edit point properties
 - i. May include adjusting datum and editing datum/coordinate properties.
- 1.2 d Add and edit point labels
 - i. May include rotating point labels; and assigning and editing point label styles.

1.3. Create and use Point Groups to control point display

- 1.3 a Create and modify Point Groups
 - i. Specifically, the properties on the Include/Exclude tab. May include grouping points by RAW Description or by Point Number; and managing point group styles.
- 1.3 b Change the point group display order

1.4. Create a parcel

- 1.4 a Explain automatic parcel creation
 - i. May include specifying proper default settings for new parcels.
- 1.4 b Create a parcel by layout
 - i. May include using parcel layout and sizing tools; and specifying minimum frontage at a frontage offset.
- 1.4 c Create a parcel from drawing objects
 - i. May include understanding what objects can be converted to parcels.

- 1.4 d Create parcels by subdividing an existing parcel
 - i. May include creating slide or swing lines; and dividing a parcel into equal segments with remainder distribution.
- 1.4 e Associate a parcel with a site
 - i. May include assigning a label style and changing the display order of parcels contained in a site.

1.5. Create and modify parcel styles and annotations

- 1.5 a Describe the difference between parcel, parcel area, and parcel segment labels
- 1.5 b Add and replace parcel labels
 - i. May include individual and multiple segment labels; parcel area labels; applying line and curve label styles; and table tag numbering.
- 1.5 c Define parcel styles
 - i. May include applying a label style; component display; reordering the priority of styles; parcel segment and area fill display.
- 1.5 d Create a parcel table
 - i. May include line, curve, segment or area tables; applying a table style; and selecting tags.
- 1.5 e Convert a label to a tag
- 1.5 f Rename and renumber parcels
- 1.5 g Delete a parcel

1.6. Understand the Civil 3D surveying tools

- 1.6 a Work with linework code sets
- 1.6 b Utilize the points in the Survey Database
 - i. May include reviewing and modifying the survey database settings.
- 1.6 c Understand the use the Traverse Editor
- 1.6 d Recognize the purpose of working with the Survey Figure Prefix Database
- 1.6 e Understand the purpose of performing a Mapcheck Analysis

2. Surfaces and grading

2.1. Identify key characteristics of surfaces

- 2.1 a Identify the parameters and display settings of surface styles
 - i. May include borders, contours, grid, points, triangles, watersheds, and display.
 - ii. May include knowledge of what parameters and display settings must be set when making specific edits to a surface.
- 2.1 b Understand a surface's build, how it was constructed and how it uses the data for calculations
 - i. May include understanding how to diagnose complex surface builds when performing grading edits

or building existing surfaces.

2.1 c Identify the data categories of a surface definition

i. May include boundaries, breaklines, contours, DEM files, drawing objects, point files, point groups, point survey queries, figure survey queries, and listing the types of objects that can be added to a surface.

2.1 d Define surface boundary types

2.1 e Access and review surfaces statistics

i. May include area and volume; minimum and maximum coordinates; and minimum, maximum, and mean elevations.

2.1 f Understand how and when to display Triangular Irregular Network (TIN) lines

2.2. Create and edit TIN surfaces and volume surfaces

2.2 a Create and edit TIN surfaces

i. May include swapping and removing surface triangle edges.

2.2 b Create a volume surface

i. May include adding a boundary.

2.2 c Edit the properties of a surface definition

i. May include selecting the boundary type, adding breaklines, adding data to a surface, applying a point group, analyzing with the Volumes Dashboard, comparing surfaces, and identifying volumes.

2.2 d Create a TIN volume surface to compare two surfaces

2.3. Create surface labels

2.3 a Create spot elevation and slope labels

i. May include applying spot elevation and slope label styles.

2.3 b Add labels to single or multiple contour lines

i. May include controlling contour display and applying contour label styles.

2.4. Identify examples of surface analysis

2.4 a Identify the properties of a surface analysis type

i. May include contours, directions, elevations, slopes, slope arrows, user-defined contours, and watersheds.

2.4 b Set the analysis parameters for a surface style

2.4 c Perform a surface analysis

2.5. Create and modify feature lines

2.5 a Create feature lines

i. May include different ways to create feature lines.

2.5 b Edit feature lines geometry

- i. May include Break, Trim, Extend, Join, and Insert/Delete PI.

2.5 c Edit feature line elevations

- i. May include inserting a high or low elevation point on a feature line; raising and lowering feature lines; setting feature line elevations from a surface; and using the Grading Elevation Editor.

2.5 d Understand how objects interact with each other when they are part of the same site

2.6. Create and modify sites and grading models

2.6 a Create and modify sites

- i. May include site definition; adding feature lines to a site; and moving or coping feature lines to another site.

2.6 b Create grading groups

- i. May include adjusting the cut and fill volumes for a grading group; and automatic surface creation.

2.6 c Use grading creation and editing tools

- i. May include creating infills, using the Grading Editor (Panorama) to edit unlocked criteria values for a grading object, and using grips to edit grading.

2.6 d Work with grading criteria

3. Alignments and profiles

3.1. Create and modify alignments

3.1 a Create an alignment from objects

- i. May include understanding the relationship between the selected objects and the resulting alignment.
- ii. May include understanding the issues that must be considered when generating an alignment from a pipe network.
- iii. May include the importance of selecting pipes and structures in a specific order.

3.1 b Create offset alignments

- i. May include offset profiles, number of offsets, offset increments, and naming templates.

3.1 c Edit alignment constraints

- i. May include length; radius; angle; type and tangency constraints; and alignment grid view.

3.1 d Add lines, curves, and spirals to an alignment

3.1 e Reverse the alignment direction

3.1 f Apply widenings for a specified length along an alignment

3.2. Create a surface profile

3.2 a Create a surface profile along an alignment

- i. May include style settings such as linetype, color, plot style, markers, right positive, left negative, and comma separated.
- ii. May include how to indicate the value, setting style, sample offsets surface profiles, and setting

stations.

3.3. Create and modify a profile

3.3 a Use profile creation tools

i. May include adding PVI, tangents, and curves (fixed, floating, and free); designing vertical profiles; and drawing tangents with curves.

3.3 b Edit layout profiles

i. May include profile curve length; grade change; editing a design profile and erasing existing entities; and visually recognizing what tool adds a PVI.

3.3 c Describe the purposes, features, and functions of the profile grid view

i. May include using Alignment Grid View to apply grade in and grade out.

3.3 d Explain how and when to add a vertical curve

3.3 e Use profile grips

3.4. Create profile views

3.4 a Describe the relationship between profiles, profile views, and profile view bands

3.4 b Identify available object types to project to a profile view

i. May include blocks, 3D solids, 3D polylines, points, feature lines, and survey figures.

3.4 c Create a profile view

i. May include using Band Styles to control the location and content of data bands labels; specifying the station range to which the profile view is drawn; and specifying the geometry to be labeled.

ii. May include using the Quick Profile tool.

3.4 d Split a profile view

3.5. Create alignment and profile annotations

3.5 a Describe the relationship between the label type and how it is placed on the alignment/profile

i. May include labeling alignment segments (single and multiple).

3.5 b Distinguish between station offset and station offset fixed point labels

3.5 c Explain how to renumber tag labels

3.5 d Work with alignment/profile labels

i. May include major and minor stations labels; alignment label sets; and alignment station offset labels.

3.5 e Use alignment tables

i. May include splitting a segment table.

4. Corridors and sections

4.1. Create a corridor

- 4.1 a Create and assign basic assemblies and subassemblies
 - i. May include changing the frequency of assemblies applied in corridors.
- 4.1 b Create a corridor
 - i. May include creating a corridor from an alignment/profile (one baseline, multiple regions like add, split, and merge); and creating a corridor from feature lines.
- 4.1 c Add multiple baselines to a corridor
- 4.1 d Add and edit targets (horizontal and vertical)
- 4.1 e Understand the concept of clearing corridor bowties
- 4.1 f Rebuild corridors

4.2. Create objects from a corridor

- 4.2 a Create objects from a corridor
 - i. May include extracting objects, corridor surfaces, and including boundaries.

4.3. Create sections, create section views, and compute materials

- 4.3 a Create sample lines
 - i. May include creating sample lines by Range of Stations.
- 4.3 b Create section sheets
- 4.3 c Edit sample line group properties
- 4.3 d Create section views
 - i. May include creating multiple sections.
- 4.3 e Compute Materials
 - i. May include using a cut/fill material.

5. Pipe networks

5.1. Create and label a pipe network

- 5.1 a Describe the purpose of the part catalog and parts list
- 5.1 b Set the part catalog location
- 5.1 c Add and modify parts and part sizes in the parts list
- 5.1 d Identify the tools used to create and modify pipe networks
 - i. May include RIM/Invert elevations, slopes, etc.
- 5.1 e Add parts, pipes, and structures to a profile view
- 5.1 f Change the pipe network flow direction
- 5.1 g Annotate plan and profile pipe networks

5.2. Create and label a pressure network

- 5.2 a Create and edit the parts list

- 5.2 b Set the part catalog location
- 5.2 c Use the Pressure Network creation tools
- 5.2 d Add pipes, appurtenances, and fittings to a profile view
- 5.2 e Add plan and profile view labels

6. Plan production and data management

6.1. Create Note label styles

- 6.1 a Use the text component editor
- 6.1 b Change the dragged state of a label
- 6.1 c Apply a label set to an object

6.2. Create view frames and sheets

- 6.2 a Create view frames
 - i. May include creating view frames based on the alignment in a drawing, a designated plan, or profile views.
- 6.2 b Insert match lines on the view frames
- 6.2 c Create sheets from a view frame group
 - i. May include the number of layouts per new drawing, all layouts in one new drawing, or all layouts in the current drawing.

6.3. Identify when to use a Data Shortcut or an External Reference

- 6.3 a Differentiate between a data shortcut and external reference
- 6.3 b Explain the concepts and procedures for managing data shortcuts

6.4. Create a reference to a Data Shortcut

- 6.4 a Create a reference to a Data Shortcut