

Autodesk Civil 3D: Fundamentals to Wet Utility Design

1. Target Audience

This course is intended for civil engineers, utility designers, infrastructure professionals, CAD/BIM technicians, drainage engineers and Civil 3D users involved in designing underground water, sanitary sewer and stormwater networks.

Prerequisites

Participants should have:

- Basic knowledge of AutoCAD or Autodesk Civil 3D
- Basic understanding of civil drawings and underground utilities
- Familiarity with surfaces, alignments and profiles is helpful but not mandatory

2. Course Objective

The objective of this course is to provide practical skills for creating, modifying, analysing and documenting wet utility networks using Autodesk Civil 3D. The course covers the complete workflow for gravity pipe networks and pressure networks, including sanitary sewer, storm drainage and potable water systems.

3. Course Outcomes

After completing this course, participants will be able to:

- Prepare survey, surface and alignment data for utility design.
- Configure pipe catalogues, parts lists, rules, styles and labels.
- Create sanitary sewer and storm drainage gravity networks.
- Create potable water distribution pressure networks.
- Display and edit utilities in plan, profile and section views.
- Check slopes, cover, elevations, crossings and design conflicts.
- Generate utility schedules, quantity reports and construction drawings.

4. Course Outline

The course comprises **40 hours of theory, demonstrations and hands-on lab exercises** divided into ten modules. The sequence follows a standard Civil 3D Essentials workflow: software fundamentals; survey data and COGO points; parcel creation; surfaces and grading; alignments and profiles; pipe and pressure network configuration; gravity pipe networks; potable-water pressure networks; utility coordination; and plan production, data management, quantities and final quality control.

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Module 1: Civil 3D Fundamentals (2 Hours)

- Civil 3D workspaces, interface, Toolspace, Panorama, ribbon and drawing environment
- Drawing templates, units, coordinate systems and drawing settings
- Core Civil 3D objects used in utility projects: points, point groups, surfaces, alignments, profiles and networks
- Overview of utility drawing organization, layer standards, external references and project-folder conventions

Module 2: Survey Data and COGO Points (3 Hours)

- Importing survey data and existing utility information
- Creating and managing COGO points, point groups, descriptions, styles and labels
- Overview of survey databases, figures and linework code sets

Hands-on Exercise: Import survey data and organise COGO points, point groups, descriptions, styles and labels for a utility project.

Module 3: Parcel Creation (3 Hours)

- Understanding sites, parcels, parcel segments and parcel topology
- Creating parcels from existing objects
- Creating parcels using parcel layout tools
- Subdividing parcels and adjusting parcel geometry
- Renumbering and renaming parcels
- Applying parcel styles and parcel label styles
- Creating parcel labels and parcel tables

Hands-on Exercise: Create, subdivide, label and tabulate parcels for a utility development site.

Module 4: Surfaces and Grading (4 Hours)

- Creating TIN surfaces from points, breaklines and boundaries
- Reviewing surface properties, statistics, contours and labels
- Editing surface definitions and performing surface analysis
- Creating and editing feature lines
- Managing sites and grading groups
- Applying grading criteria and creating grading objects
- Creating volume surfaces and reviewing cut-and-fill results
- Using finished and existing surfaces to support utility cover and structure elevations

Hands-on Exercise: Build and analyse an existing-ground surface, create feature-line-based grading, and review cut-and-fill results.

Module 5: Alignments and Profiles (4 Hours)

- Creating utility route alignments from layout tools and existing objects
- Editing alignment geometry and design properties
- Creating surface profiles and profile views
- Creating and editing layout profiles
- Configuring profile-view styles, bands and labels
- Establishing horizontal and vertical controls for utility design

Hands-on Exercise: Create a utility alignment, surface profile, layout profile and annotated profile view.

Module 6: Pipe and Pressure Network Setup, Parts and Styles (3 Hours)

- Understanding pipe catalogues and network parts
- Creating gravity and pressure network parts lists
- Selecting pipes, structures, fittings and appurtenances
- Configuring pipe rules for slope, cover and size
- Creating plan, profile and model styles
- Creating pipe, structure and pressure-network labels
- Overview of Part Builder and Content Catalog Editor

Hands-on Exercise: Configure parts lists, rules, styles and labels for a wet utilities project.

Module 7: Gravity Pipe Networks—Sanitary Sewer and Storm Drainage (7 Hours)

- Understanding gravity pipe-network components, structures and design principles
- Planning sanitary sewer routes, stormwater collection paths and discharge locations
- Creating gravity networks by layout and from existing objects
- Placing sewer pipes, manholes, inlets, catch basins and outfalls
- Applying sewer criteria for minimum slopes, cover depths and invert control
- Using catchments and flow paths to support storm-drainage layout decisions
- Setting storm pipe sizes, slopes and structure elevations from drainage requirements
- Editing gravity networks in plan and profile views
- Applying network rules, reviewing violations and annotating pipes and structures
- Reviewing the workflow for external hydraulic analysis without duplicating network modelling

Hands-on Exercise: Create coordinated sanitary sewer and storm-drainage gravity networks, including structures, profiles, rules and annotations.

Module 8: Pressure Networks—Potable Water Distribution (6 Hours)

- Understanding pressure network components and terminology
- Creating pressure networks using layout and path-based methods
- Placing water mains, fittings, valves and hydrants

- Creating branches, bends and network connections
- Controlling pipe depth and minimum cover
- Editing pressure networks in plan and profile views
- Labelling water mains and appurtenances

Hands-on Exercise: Create a potable water distribution network with valves, fittings and hydrants.

Module 9: Utility Coordination, Profiles and Network Documentation (4 Hours)

- Reviewing combined gravity and pressure network profiles for utility coordination
- Running interference checks between gravity and pressure networks
- Reviewing crossing elevations and minimum horizontal and vertical clearances
- Prioritising conflict resolution based on utility type and design constraints
- Adjusting network geometry to resolve clashes without compromising design intent
- Documenting utility crossings and resolved conflicts in coordinated plan, profile and section views

Hands-on Exercise: Identify and correct conflicts between multiple utility networks.

Module 10: Plan Production, Data Management, Quantities and Final Quality Control (4 Hours)

- Creating and managing view frames and match lines
- Creating utility plan and profile sheets from view frame groups
- Using data shortcuts and external references
- Generating pipe, structure, fitting and appurtenance tables
- Extracting pipe lengths, diameters, materials and structure quantities
- Auditing annotations, styles, references and drawing standards

Hands-on Exercise: Create utility plan and profile sheets, generate network tables, extract basic quantities and check drawing annotations.