Unit 233: Install drainage

# Delivery guide

Unit information

The aim of this unit is to provide learners with the relevant practical skills and understanding required for installing drainage, in a construction and civil engineering environment. It also covers interpreting information, adopting safe, healthy and environmentally responsible work practices, and selecting, preparing and using materials, components, tools and equipment.

Learners may be introduced to this unit by asking themselves questions such as:

* What typical work is covered when installing drainage on construction sites?
* Why is health and safety important when laying drainage?
* Why do we need to lay drainage when completing civil engineering activities?
* How many different types of drainage systems are there?

Learning outcomes

1. Understand resource selection
2. Understand working to a contract specification
3. Comply with the given contract information to carry out the work safely and efficiently to the required specification

Suggested resources

Textbooks

* Kendrick, P. (2004) *Roadwork: Theory and Practice*, 5th edition. London: Routledge. ISBN 9-7807-506-6470-7
* Chudley, R. (2020) *Chudley and Greeno's Building Construction Handbook*, 12th edition. London: Routledge.   
  ISBN 9-7803-671-3543-0
* Pitman, P. (2017) *External Works, Roads and Drainage: A Practical Guide*, 1st edition. London: CRC Press. ISBN 9-7811-384-0887-6
* Butler, D., Digman, C. J., Makropoulos, C., Davies, J. W. (2018) *Urban Drainage*, 4th edition.London: CRC Press.   
  ISBN 9-7814-987-5058-5

Websites

* [Cadw (gov.wales)](https://cadw.gov.wales/) | Homepage
* [Constructing Excellence | Homepage](https://constructingexcellence.org.uk)
* [HSE | Homepage](https://www.hse.gov.uk)
* [Oxford University Press | Free Building & Construction resources](https://global.oup.com/education/secondary/subjects/vocational/building/free-resources/?region=international)
* [Construction Knowledge | Excavation](https://www.constructionknowledge.net/sitework/sitework_excavation.php)
* [NHBC | Substructure, Ground-floors, Drainage and Basements – Drainage below ground](https://nhbc-standards.co.uk/5-substructure-ground-floors-drainage-and-basements/5-3-drainage-below-ground/)
* [GOV.uk | Drainage and waste disposal: Approved Document H](https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h)

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
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| 1. Understand resource selection | * 1. Characteristics of the resources | * Learners to understand the range of resources used to install drainage to drawings specifications and schedules. * Learners to have a knowledge of drainage components and to be able to identify defects that can affect the structural integrity and which need replacing and those that only affect the aesthetics. * Learners to know the uses and limitations of drainage components and sustainable alternatives. * Materials could include inspection chambers, deep manhole chambers, fittings, couplings, junctions, P trap gully, bottle gully, gully hoppers, manholes (plastic, fibreglass, precast concrete), manhole covers, sealant materials (adhesives, compounds, solvents), side fill or backfill material, aggregates (pea shingle), cementitious materials and bricks, blocks and sandbags, lubricant, pipes, below 150mm diameter, or above 150mm diameter. * Tools and equipment could include harness equipment, tripods, gantry and winches, shovels and picks, wheelbarrow, hand saws, hand files, tape measure, spirit level, power drills, transformers and generators, mini excavator, disc cutters, pipe cutters. |
| * 1. Use of resources | * Learners to understand how the resources should be used and how any problems associated with the resources are reported. * Learners to know the procedures and reporting protocols to follow to report any problems, as well as defects or concerns with selected resources. * Learners to know how to select and use tools and equipment for their intended purpose and how to rectify or report any defects. |
| * 1. Organisational procedures to select resources | * Learners to understand working procedures used to select the most appropriate methods to install drainage related materials, in accordance with written instructions, drawings, schedules and verbal instructions to meet the contract size/needs. * Learners to know how to raise requisitions and order resources to complete a specific task using organisational procedures. |
| * 1. Hazards | * Learners to be able to identify the hazards associated with installing drainage-related materials, the maintenance and replacement of material components, as well as the correct method of work required to install drainage-related materials. * Learners to know the importance of working to method statements and risk assessments which will relate to open excavations, moving plant and equipment, slips, trips and falls, working at height, hand and eye injuries and potentially being hit by falling objects. |
| 1. Understand working to a contract specification | * 1. Methods of work | * Learners to know and understand the application of safe and healthy work practices, procedures and skills relating to the method, process and area of work. * Learners to be able to plan their work efficiently from the given instructions and complete the work to the agreed specifications. * Learners to understand the importance of communication among team members during activities, as well as the needs of other occupations working alongside them. * Learners to understand the correct methods used to establish dimensions accurately and to establish the setting out details from drawings, specifications and verbal instructions. |
| * 1. Tools and equipment | * Learners to know and understand the importance of maintaining tools and equipment and the operative care associated with hand tools, portable power tools, powered units, machinery and ancillary equipment. * Learners to understand the possible dangers if tools and equipment are not maintained. * Learners to understand procedures such as start-up and shut down checks, calibration and planned maintenance schedules. * Learners to know how to maintain equipment to ensure its accuracy in future use and how equipment should be cleaned and maintained after use. * Learners to understand methods for maintaining tools and equipment to check for accuracy and cleaning equipment after use. |
| 1. Comply with the given contract information to carry out the work safely and efficiently to the required specification | * 1. Lay bedding materials, install and test pipework (e.g., clay, concrete, metal, or plastic) for new and/or replacement, foul and/or surface water drainage | * Learners to demonstrate that they can plan for installing drainage by following the information and guidance given to them by using the relevant documentation. * Learners to be able to follow method statements and comply with a work programme to plan efficiently for the work to be carried out within the agreed time for the work. |
| * 1. Demonstrate work skills to measure, check, mark out, cut, lay, position, fit, join, level, plumb, align, secure and test | * Learners to be able to: * lay and install new drainage pipes and components to line and level and to an adequate gradient * test/check completed drainage units and components to ensure line and gradient are maintained and carry out either a water or an air test. |
| * 1. Surround pipe with specified materials | * Learners tobe able to: * surround drainage pipes to the given instructions using the specified materials following health and safety and approved regulation requirements * surround pipe materials such as sand, shingle and cementitious material. |
|  | * 1. Backfill to trench using given work instruction for both compacted and free drainage materials | * Learners tobe able to: * backfill trenches to the given instructions, using the specified materials, following health and safety and approved regulation requirements * backfill materials, such as pea shingle, granular materials not exceeding 40mm and soil * ensure backfilled materials are free from boulders, building rubble, timber and vegetable matter. |