Unit 64: Highway Construction and Maintenance in Civil Engineering

Unit code: J/600/0384

QCF Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

This unit provides learners with knowledge of highway planning and the processes involved in the construction of earthworks for new highways and highway maintenance. It gives them an understanding of methods used to drain highways and subsoils, and the skills to specify highway pavement construction.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes	Assessment criteria
1 Know how a new highway is planned	1.1 Identify the procedures used to plan a new highway
	1.2 Describe the constraints that public consultation, land acquisition and funding methodologies may impose on the planning of a new highway
2 Know the processes involved in the construction of earthworks for new highways	2.1 Describe site clearance and earthwork processes
	2.2 Describe how the line and level of earthworks is controlled
3 Be able to specify different forms of highway pavement construction	3.1 Produce details of commonly used forms of highway pavement construction
	3.2 Produce material specifications for highway pavement construction
4 Understand the methods used to drain highways and subsoils	4.1 Explain how surface water is collected from the paved surface of highways

	4.2 Explain the methods used for land and subsoil drainage
5 Know highway maintenance processes	5.1 Describe structural, routine and winter maintenance of highways

Unit content

1 Know how a new highway is planned

Planning a new highway: land acquisition; route location; public consultation; allocation of resources; design of line and level

Land acquisition: procedures to acquire land; potential problems

Route location: assessment of traffic volumes; environmental impact; potential earthwork problems; choice of alignment; procedures to consult public; public enquiries

Allocation of resources: funding of new highways (design, build, finance, operate – DBFO); private and/or public funding

Design of line and level: factors that affect vertical and horizontal alignment

2 Know the processes involved in the construction of earthworks for new highways

Earthworks: site clearance; cut and fill; embankment construction; control of line and level; treatment of weak areas

Site clearance: advance fencing contracts; grubbing out: stripping topsoil

Cut and fill: setting out embankments and cuttings; plant used; mass haul curves; computer applications

Embankment construction: end product or method specification; control of line and level; suitable and unsuitable materials for fill; procedures and testing as work proceeds

Treatment of weak areas: replacement; stabilisation; drainage techniques

3 Be able to specify different forms of highway pavement construction

Highway pavement construction: different forms of construction; methods of construction; material specification; quality control

Different forms of construction: flexible; rigid composites; flexible composites; continuously reinforced concrete roadbase (CRCR)

Methods of construction: paving machines; slip form and fixed form pavers; manual and semi-manual methods of constructing elements; use of site profiles and automatic paver guidance techniques; compaction procedures

Quality control: sampling of materials; temperature checks; analysis and testing of materials; checks on the finished road surface

Material specification: bituminous materials; concrete and cement bound materials (CBM)

4 Understand the methods used to drain highways and subsoils

Highway drainage: surface water drains; collection of run-off from paved surfaces; land and subsoil water drains; pipework; manholes; disposal of collected water

Surface water drains: conventional kerb and gully; side filter drains; grips and ditches; combined kerb/main drain; gully spacing and construction

Collection of run-off from paved surfaces: camber; crossfall; longitudinal fall; crowned channels

Land and subsoil drains: arrangement of patterns; types of pipe; typical cross-sections

Pipework: connections to main drain; laying methods; support and protection; backfill

Manholes: purposes; forms of construction; materials used; typical cross-sections

Disposal of collected water: soakaways; water courses; catchpits; associated calculations

5 Know highway maintenance processes

Highway maintenance: different types of maintenance; defects in highways; maintenance processes

Different types of maintenance: structural; routine; winter

Defects in highways: structural defects; identification by inspection and testing; typical results; application of maintenance standards; selection of remedial treatments from examination and collected and established data

Maintenance processes: patching; resurfacing; reconstruction; surface dressing; use of sealants; resetting kerbs and flags; slurry sealing and retreading