

## **Unit 4 Reinstatement and compaction of backfill material**

This unit covers the requirements that you must meet when reinstating openings in highways. **You must ensure that you act in accordance with all current specifications and procedures and that you follow safe working practices at all times when carrying out the activities covered in this unit. The Code of Practice specified in this unit is *Specification for the Reinstatement of Openings in Highways*.**

The unit contains the following four elements, which you must cover:

- 4.1 Identify different types of footway and carriageway
- 4.2 Select materials for backfill
- 4.3 Backfill excavation
- 4.4 Dispose of surplus material

In element 4.1, you will need to identify the main types of footway and carriageway correctly. You will also need to identify the construction layers within the main types of footway and carriageway.

In element 4.2, you will need to identify and select excavated materials for re-use as backfill and ensure that they are appropriately and safely stored on site. You must identify, unload and store imported materials that are suitable for use as backfill safely and correctly. You will need to store all materials on site without obstructing or damaging facilities and street furniture, and you will need to identify the correct backfill materials to use as surround to utilities' apparatus and in sensitive areas.

In element 4.3, you must backfill the excavation, selecting the appropriate equipment to use for the specific operation. You will need to reinstate the backfill layer to the correct level and complete the operation without damaging underground utilities' apparatus. You must also compact the backfill materials to provide a firm base for advancement.

In element 4.4, you will dispose of surplus material. You will need to identify materials that are unsuitable for re-use or are surplus to requirements, and ensure that safe temporary storage is provided for them on site. You must load all materials for disposal safely for transportation, using the appropriate equipment, and you must leave the site in a clean and safe condition.

Please note: *You must use metric units of linear measurement when undertaking this unit.*

*Where the term **utilities' apparatus** is used within these qualifications, this includes the following:*

- *gas mains (plastic and metallic)*
- *water mains (plastic and metallic)*
- *sewers and drains*
- *electricity cables (low- and high-voltage)*
- *telecommunications and television cables*

## Unit 4 Reinstatement and compaction of backfill material

### Element 4.1 Identify different types of footway and carriageway

Performance criteria	
<p>You must show that:</p> <p>a) you identify the main <b>types of footway and carriageway</b> in accordance with current relevant <b>specifications and procedures</b></p> <p>b) you identify <b>construction layers</b> in the main <b>types of footway and carriageway</b> in accordance with current <b>specifications and procedures</b></p>	
Knowledge requirements	Related performance criteria
<p>You need to know:</p> <p>1 the physical characteristics of the main types of footway and carriageway</p> <p>2 the characteristics of a high duty or high amenity footway, footpath or cycle track</p> <p>3 how to distinguish between different types of footway and carriageway</p> <p>4 how to distinguish between the different construction layers within footways and carriageways</p>	<p>a</p> <p>a</p> <p>a</p> <p>b</p>
Range to be covered	
<p>I. You must show that you identify the following <b>types of footway and carriageway</b>:</p> <p>i. flexible footway and carriageway</p> <p>ii. modular footway and carriageway</p> <p>iii. rigid footway and carriageway</p> <p>iv. composite carriageway</p> <p>II. You must show that you identify the following <b>construction layers</b> in footways and carriageways:</p> <p>i. surface course</p> <p>ii. binder course</p> <p>iii. base (roadbase)</p> <p>iv. sub-base</p> <p>v. block/sett</p> <p>vi. slab</p> <p>vii. bed</p> <p>III. You must show that <b>specifications and procedures</b> are:</p> <p>i. Health and Safety Executive Guidelines (<i>HSG 185: Health and Safety in Excavations</i>)</p> <p>ii. Specification for the Reinstatement of Openings in Highways</p>	

## **Unit 4 Reinstatement and compaction of backfill material**

### **Element 4.1 Identify different types of footway and carriageway**

#### **Evidence requirements**

- Your evidence must cover all the performance criteria, all the knowledge requirements and all the range items listed in this element.
- You must identify the following types of footway and carriageway and their separate construction layers, by visual inspection on site or under simulated conditions, as listed below:
  - A. Flexible footway and carriageway
  - B. Modular footway and carriageway
  - C. Rigid footway and carriageway
  - D. Composite carriageway

#### **Specification of works**

- The assessment must take place at a site with physical characteristics that conform to the definition of 'street' at section 48 or 'road' at section 107 of the New Roads and Street Works Act 1991.

#### **Assessment conditions**

- The assessment will be undertaken by a qualified assessor, who will observe you identifying the different types of footway and carriageway.
- The site at which you are assessed must conform to the specifications listed above. Real equipment must be used, that complies with the requirements of the Code of Practice.
- Where you provide supplementary evidence of competence from your workplace, which includes a documented observation report, a qualified Street Works operative, supervisor or assessor must provide this.

#### **Additional information for candidates and assessors**

- The adopted specification for the works should correspond to the *Specification for the Reinstatement of Openings in Highways*. The following sections of the Specification provide particular guidance on various items within the performance criteria:
  - i S1.4 categorises footways, footpaths and cycle tracks into three groups – *high duty*, *high amenity*, and *other*.
  - ii NG3.2 refers to HSG 185 (*Health and Safety in Excavations*) which gives guidance to those carrying out excavations.
  - iii For the purposes of defining permissible material options, layer thickness, etc., A2.8.1 classifies road structures as being of flexible, composite, rigid or modular design.

## Unit 4 Reinstatement and compaction of backfill material

### Element 4.2 Select materials for backfill

Performance criteria	
<p>You must show that:</p> <ul style="list-style-type: none"> <li>a) you identify and select excavated <b>materials</b> that are suitable for use as backfill</li> <li>b) you select appropriate quantities of the <b>materials</b> to complete the reinstatement</li> <li>c) you store excavated <b>materials</b> set aside for re-use appropriately and protect them from excessive drying or wetting</li> <li>d) you identify imported <b>materials</b> correctly that are suitable for use as backfill</li> <li>e) you unload and store imported <b>materials</b> safely and appropriately</li> <li>f) you identify the correct backfill <b>materials</b> to use as surround to utilities' apparatus and in sensitive areas</li> <li>g) you store <b>materials</b> without obstructing or damaging essential facilities and street furniture</li> <li>h) you follow <b>safe working practices</b> for selecting and storing backfill materials, that are in accordance with current relevant <b>specifications and procedures</b></li> </ul>	
Knowledge requirements	Related performance criteria
<p>You need to know:</p> <ul style="list-style-type: none"> <li>1 how to identify different types of excavated materials and determine their suitability for use as backfill</li> <li>2 how to calculate the quantities of materials required for a reinstatement</li> <li>3 where to store re-usable backfill materials and how to store them correctly</li> <li>4 how to identify different types of imported materials and determine their suitability for use as backfill</li> <li>5 how to safely unload and store imported backfill materials</li> <li>6 the correct backfill materials to use as surround to utilities' apparatus</li> <li>7 the implications of using unsuitable material for backfill</li> <li>8 what constitutes a sensitive area and the correct backfill materials to use in these areas (including close proximity to tree roots)</li> <li>9 how to minimise obstruction of essential facilities and obstruction or damage to street furniture</li> <li>10 safe working practices for selecting and storing backfill materials</li> </ul>	<ul style="list-style-type: none"> <li>a</li> <li>b</li> <li>c</li> <li>d</li> <li>e</li> <li>f</li> <li>a, d, f</li> <li>f</li> <li>g</li> <li>h</li> </ul>
Range to be covered	
<ul style="list-style-type: none"> <li>I. You must show that the types of <b>materials</b> encountered during reinstatement include: <ul style="list-style-type: none"> <li>i. Class A</li> <li>ii. Class B</li> <li>iii. Class C</li> <li>iv. Class D</li> <li>v. Class E</li> </ul> </li> </ul>	

## Unit 4 Reinstatement and compaction of backfill material

### Element 4.2 Select materials for backfill

#### Range to be covered (contd.)

- II. You must show that **safe working practices** are:
- i. Safe use of tools and equipment
  - ii. Use of appropriate personal protective equipment, including as necessary:
    - high visibility jacket or waistcoat
    - hard hat
    - ear defenders
    - eye protection visor/goggles
    - dust mask
    - gloves
    - protective footwear
    - waterproof clothing
  - iii. use of risk assessment methods to identify and control hazards on site
  - iv. precautions to minimise danger or inconvenience to road users
  - v. precautions to minimise danger or inconvenience to site personnel
  - vi. precautions to minimise damage to equipment or apparatus
- III. You must show that **specifications and procedures** are:
- i. Health and Safety Executive Guidelines (*HSG 185: Health and Safety in Excavations*)
  - ii. Specification for the Reinstatement of Openings in Highways

#### Evidence requirements

- Your evidence must cover all the performance criteria, all the knowledge requirements and all the range items listed in this element.
- You must complete the following tasks for an excavated area:
  - A. Use field identification tests to select suitable backfill materials.
  - B. Carry out field tests on imported materials.
  - C. Store and protect all backfill materials appropriately.

#### Specification of works

- The assessment must take place at a site with physical characteristics that conform to the definition of 'street' at section 48 or 'road' at section 107 of the New Roads and Street Works Act 1991.
- The excavated area must be a minimum area of 0.7 square metres, and to a minimum depth of 600 mm.

#### Assessment conditions

- The assessment will be undertaken by a qualified assessor, who will observe you selecting materials for backfill.
- The site at which you are assessed must conform to the specifications listed above. Real equipment must be used that complies with the requirements of the Code of Practice.
- Where you provide supplementary evidence of competence from your workplace, which includes a documented observation report, a qualified Street Works operative, supervisor or assessor must provide this.

#### Additional information for candidates and assessors

- The adopted specification for the works should correspond to the *Specification for the Reinstatement of Openings in Highways*. The following sections of the Specification provide particular guidance on various items covered by the performance criteria:
  - i S1.6.3 allows alternative options such as stabilised materials to be used as surround to apparatus, and at backfill and sub-base layers, provided they meet the relevant performance requirements of this Specification.
  - ii S1.10.3 requires the backfill materials in the sensitive areas near trees to contain an inert granular material mixed with topsoil or sharp sand (not builders sand) around the retained roots. This should allow the soil to be compacted for resurfacing without damage to the roots and should secure a local aerated zone enabling the roots to survive in the longer term.
  - iii S5 deals with classification of backfill material, whether imported to site or derived on-site from excavated materials, including alternative reinstatement materials and those used as surround to apparatus.
  - iv Notes for Guidance NG5.1 and NG5.3 deal with requirements of conventional and alternative backfill materials, respectively.
  - v Appendix A1 deals with the necessary properties of backfill materials.
  - vi Appendix A9 deals with the properties of the alternative reinstatement materials.

## Unit 4 Reinstatement and compaction of backfill material

### Element 4.3 Backfill excavation

Performance criteria	
<p>You must show that:</p> <ol style="list-style-type: none"> <li>you select <b>equipment</b> for reinstatement and compaction that is fit for purpose, suitable to the <b>material</b> type and trench dimensions and that will enable you to avoid damaging underground utilities' apparatus</li> <li>you reinstate the backfill layer to the correct level</li> <li>you complete the backfilling without damaging underground utilities' apparatus</li> <li>you compact backfill <b>materials</b> to provide a firm base for advancement and minimise the need for subsequent reinstatement visits</li> <li>you follow <b>safe working practices</b> for the reinstatement and compaction of backfill that are in accordance with current relevant <b>specifications and procedures</b></li> </ol>	
Knowledge requirements	Related performance criteria
<p>You need to know:</p>	
1 how to select equipment for reinstatement and compaction operations on the basis of the material type and trench dimensions and how to ensure it is fit for purpose	a
2 the types and nature of equipment that minimise the potential for damage to underground utilities' apparatus	a, c
3 the level to which the backfill layer should be reinstated	b
4 the amount of compaction required for each layer for specific equipment to provide a firm basis for advancement and to minimise the need for subsequent reinstatement visits	d
5 safe working practices for the reinstatement and compaction of backfill materials	all
Range to be covered	
<p>I. You must show that <b>equipment</b> includes:</p> <ol style="list-style-type: none"> <li>appropriate hand tools – including square mouth shovels, travelling site stick or depth-gauge</li> <li>powered equipment – including vibrotamper or vibrating plate, percussive rammer and vibrating roller</li> </ol> <p>II. You must show that the types of <b>materials</b> encountered during reinstatements include:</p> <ol style="list-style-type: none"> <li>Class A</li> <li>Class B</li> <li>Class C</li> <li>Class D</li> <li>Class E</li> </ol> <p>III. You must show that <b>safe working practices</b> are:</p> <ol style="list-style-type: none"> <li>safe use of tools and equipment</li> <li>use of appropriate personal protective equipment, including as necessary: <ul style="list-style-type: none"> <li>• high visibility jacket or waistcoat</li> <li>• hard hat</li> <li>• ear defenders</li> <li>• eye protection visor/goggles</li> <li>• dust mask</li> <li>• gloves</li> <li>• protective footwear</li> <li>• waterproof clothing</li> </ul> </li> <li>use of risk assessment methods to identify and control hazards on site</li> <li>precautions to minimise danger or inconvenience to road users</li> <li>precautions to minimise danger or inconvenience to site personnel</li> <li>precautions to minimise damage to equipment or apparatus</li> </ol> <p>IV. You must show that <b>specifications and procedures</b> are:</p> <ol style="list-style-type: none"> <li>Health and Safety Executive Guidelines (HSG 185: Health and Safety in Excavations)</li> <li>Specification for the Reinstatement of Openings in Highways</li> <li>utilities' requirements</li> </ol>	

## **Unit 4 Reinstatement and compaction of backfill material**

### **Element 4.3 Backfill excavation**

#### **Evidence requirements**

- Your evidence must cover all the performance criteria, all the knowledge requirements and all the range items listed in this element.
- You must complete the following tasks for an excavated area in a footway or carriageway:
  - A. Select and use compaction plant.
  - B. Place materials and construct layers.
  - C. Select and use safety equipment.

#### **Specification of works**

- The assessment must take place at a site with physical characteristics that conform to the definition of 'street' at section 48 or 'road' at section 107 of the New Roads and Street Works Act 1991.
- The excavated area must be a minimum area of 0.7 square metres, and to a minimum depth of 600 mm.

#### **Assessment conditions**

- The assessment will be undertaken by a qualified assessor, who will observe you backfilling an excavation.
- The site at which you are assessed must conform to the specifications listed above. Real equipment must be used, that complies with the requirements of the Code of Practice.
- Where you provide supplementary evidence of competence from your workplace, which includes a documented observation report, a qualified Street Works operative, supervisor or assessor must provide this.

#### **Additional information for candidates and assessors**

- The adopted specification for the works should correspond to the *Specification for the Reinstatement of Openings in Highways*. The following sections of the Specification provide particular guidance on various items covered by the performance criteria:
  - i S3 covers the excavation process of roads, including breaking the surface, excavation process, excavated materials, side support, drainage, abortive excavation and trenchless excavation.
    - S3.1.1 states that care must be taken when cutting surface layers to avoid undue damage to the running surface or to the bond between the surface course and binder course materials.
    - S3.2.1 requires all excavations in the road to be carried out in a manner that avoids undue damage.
    - S3.2.2 requires the trench width to be such that adequate access is available for compaction of the surround to apparatus.
    - S3.2.3 requires the trench walls to be even and vertical with no significant undercutting of the running surface. If undercutting occurs, measures shall be taken to fill any voids as soon as practicable or immediately after trench support has been provided.
    - S3.2.4 requires protection of excavations, as far as is reasonably practical, from the ingress of water, and water running into them shall be drained or pumped to an approved disposal point. Any drainage sumps shall be sited so as to prevent damage to the excavation.
  - ii Notes for Guidance NG3.2 on excavation refers to HSG 185 (*Health and Safety in Excavations*) which gives guidance to those carrying out excavations. It also states that where possible all excavations should be planned before commencement of works on site. The work must also be undertaken and supervised by properly qualified personnel.
  - iii NG3.4 (*Side Support*) states that where required, there must be sufficient quantities of appropriate materials available to provide safe trench support.

## Unit 4 Reinstatement and compaction of backfill material

### Element 4.4 Dispose of surplus material

Performance criteria	
<p>You must show that:</p> <p>a) you identify <b>materials</b> that are unsuitable for re-use or surplus to requirements and provide safe temporary storage for them on site</p> <p>b) you load all types of <b>materials</b> for disposal safely for transportation to the designated disposal area, using the <b>appropriate equipment</b> and at the appropriate time</p> <p>c) you leave the site in a clean and safe condition</p> <p>d) you follow <b>safe working practices</b> for disposing of surplus materials that are in accordance with current relevant <b>specifications and procedures</b></p>	
Knowledge requirements	Related performance criteria
<p>You need to know:</p> <p>1 how to determine whether excavated materials are unsuitable for re-use or surplus to requirements</p> <p>2 how to store unsuitable materials away from re-usable materials on site, and the distance required between them to ensure re-usable or imported materials are not contaminated</p> <p>3 how to load materials safely for transportation</p> <p>4 the time limit to impose in removing surplus materials</p> <p>5 the action to take to leave the site in a clean and safe condition</p> <p>6 safe working practices for disposing of surplus materials</p>	<p>a</p> <p>a</p> <p>b</p> <p>b</p> <p>c, d</p> <p>all</p>
Range to be covered	
<p>I. You must show that <b>materials</b> are:</p> <p>i. unsuitable surplus materials</p> <p>ii. surplus materials that are suitable for re-use</p> <p>II. You must show that the <b>appropriate equipment</b></p> <p>i. square mouth shovels</p> <p>ii. hard bristle brooms</p> <p>III. You must show that <b>safe working practices</b> are:</p> <p>i. safe use of tools and equipment</p> <p>ii. use of appropriate personal protective equipment, including as necessary:</p> <ul style="list-style-type: none"> <li>• high visibility jacket or waistcoat</li> <li>• hard hat</li> <li>• ear defenders</li> <li>• eye protection visor/goggles</li> <li>• dust mask</li> <li>• gloves</li> <li>• protective footwear</li> <li>• waterproof clothing</li> </ul> <p>iii. use of risk assessment methods to identify and control any hazards on site</p> <p>iv. precautions to minimise danger or inconvenience to road users</p> <p>v. precautions to minimise danger or inconvenience to site personnel</p> <p>vi. precautions to minimise damage to equipment or apparatus</p> <p>IV. You must show that <b>specifications and procedures</b> are:</p> <p>i. Health and Safety Executive Guidelines (<i>HSG 185: Health and Safety in Excavations</i>)</p> <p>ii. Specification for the Reinstatement of Openings in Highways</p>	

## **Unit 4 Reinstatement and compaction of backfill material**

### **Element 4.4 Dispose of surplus material**

#### **Evidence requirements**

- Your evidence must cover all the performance criteria, all the knowledge requirements and all the range items listed in this element.
- You must complete the following tasks for a surfaced area of actual or simulated footway or carriageway:
  - A. Identify, provide temporary storage for, and load surplus materials for disposal.
  - B. Clean the site.

#### **Specification of works**

- The assessment must take place at a site with physical characteristics that conform to the definition of 'street' at section 48 or 'road' at section 107 of the New Roads and Street Works Act 1991.

#### **Assessment conditions**

- The assessment will be undertaken by a qualified assessor, who will observe you disposing of surplus materials following the reinstatement and compaction of backfill.
- The site at which you are assessed must conform to the specifications listed above. Real equipment must be used that complies with the requirements of the Code of Practice.
- Where you provide supplementary evidence of competence from your workplace, which includes a documented observation report, a qualified Street Works operative, supervisor or assessor must provide this.

#### **Additional information for candidates and assessors**

- The adopted specification for the works should correspond to the *Specification for the Reinstatement of Openings in Highways*. The following sections of the Specification refer particularly to re-usable materials:
  - i S3.3.2 indicates that any "excavated material which is unsuitable for re-use should be removed from site as soon as practicable."
  - ii S5.3.5 and A8.2 (*Chalk material suitability for reinstatement*) state that if chalk is unstable after compaction, the unstable material shall be removed and replaced with fresh material and compacted accordingly. If the chalk is still unusable after compaction, it shall be deemed to be unsuitable for use as backfill and replaced with alternative materials.
  - iii S6.3.4 (*Disposal of modular materials within the excavation*) states, under item (3) that "where surplus modules, cobbles or setts are removed from site, they shall remain the property of the Authority. The Undertaker shall notify the Authority and retain them for 10 days following such notification. Thereafter, the Undertaker shall be free to dispose of all remaining modules, cobbles and setts."