

Unit 3 Excavation in the highway

This unit covers the requirements that you must meet when carrying out excavation activities in the highway. **You must ensure that you act in accordance with all current specifications and procedures and that you identify and 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:

- 3.1 Identify different types of footway and carriageway
- 3.2 Excavate in the highway
- 3.3 Support underground apparatus during excavation
- 3.4 Identify, select and store excavated materials for re-use as backfill

In element 3.1, 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 3.2, you will need to select suitable equipment to carry out excavation activities. You must ensure that materials are excavated according to specifications and that areas of high risk are excavated with caution. The working methods that you select must minimise subsequent reinstatement. You must ensure that trenches are excavated to the correct dimensions.

In element 3.3, you will need to take appropriate action to report any damaged utilities' apparatus that you identify. You must also ensure that you support exposed utilities' apparatus safely and that you have sufficient quantities of materials available to provide adequate trench support.

In element 3.4, you will need to identify and select different types of materials that are suitable for re-use as backfill. You must ensure that re-usable materials are safely stored and protected from contamination and excessive drying or wetting, and that you store materials that are unsuitable for re-use safely on the site and ensure that procedures are in place for their safe disposal.

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*

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Element 3.1 Identify different types of footway and carriageway

Performance criteria	
<p>You must show that:</p> <p>a) you identify the main types of footway and carriageway in accordance with current relevant specifications and procedures</p> <p>b) you identify construction layers in the main types of footway and carriageway in accordance with current relevant specifications and procedures</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 identify the different construction layers within footways and carriageways and distinguish between them</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 types of footway and carriageway:</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 construction layers 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 specifications and procedures 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>	

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Element 3.1 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 that conforms 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 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 *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., Appendix A2.8.1 classifies road structures as being of flexible, composite, rigid or modular design.

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Element 3.2 Excavate in the highway

Performance criteria									
<p>You must show that:</p> <ol style="list-style-type: none"> you select suitable equipment for the excavation and ensure that it is fit for purpose you excavate materials at all construction layers according to specifications where you identify an area of high risk, you excavate with caution the working methods you use minimise subsequent reinstatement you excavate trenches to the correct dimensions you follow safe working practices for excavating in the highway, that are in accordance with current relevant specifications and procedures 									
Knowledge requirements	Related performance criteria								
<p>You need to know:</p> <ol style="list-style-type: none"> how to select equipment that is suitable to the excavation operation how to check that equipment is fit for purpose the specifications to follow when excavating trenches how to identify an area of high risk, and the precautions to take when excavating in high risk areas (including in close proximity to trees) the working methods to select to minimise subsequent reinstatement the different categories of trenches, and the correct dimensions to use for trenches that you excavate safe working practices for excavation activities 	<p>a</p> <p>a, f</p> <p>b, f</p> <p>b, c, f</p> <p>d</p> <p>e</p> <p>all</p>								
Range to be covered									
<ol style="list-style-type: none"> You must show that suitable equipment includes: <ol style="list-style-type: none"> appropriate hand tools – including square and round mouth shovels appropriate powered equipment – including pavement saw and breaking-out tools You must show that safe working practices are: <ol style="list-style-type: none"> safe use of tools and equipment use of appropriate personal protective equipment for excavation activities, including as necessary: <table border="0"> <tr> <td>• high visibility jacket or waistcoat</td> <td>• dust mask</td> </tr> <tr> <td>• hard hat</td> <td>• gloves</td> </tr> <tr> <td>• ear defenders</td> <td>• protective footwear</td> </tr> <tr> <td>• eye protection visor/goggles</td> <td>• waterproof clothing</td> </tr> </table> use of risk assessment methods to identify and control hazards on site precautions to minimise danger or inconvenience to road users precautions to minimise danger or inconvenience to site personnel precautions to minimise damage to equipment or apparatus You must show that specifications and procedures are: <ol style="list-style-type: none"> Health and Safety Executive Guidelines (<i>HSG 185: Health and Safety in Excavations</i>) Specification for the Reinstatement of Openings in Highways manufacturers' operating procedures for powered tools and plant 		• high visibility jacket or waistcoat	• dust mask	• hard hat	• gloves	• ear defenders	• protective footwear	• eye protection visor/goggles	• waterproof clothing
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Element 3.2 Excavate in the highway

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 actual or simulated excavation in a footway of modular construction:
 - A. Select all appropriate excavation equipment
 - B. Lift surfacing modules
 - C. Check excavation is properly executed within acceptable tolerances
 - D. Check trench dimensions are correct.

AND

- You must complete the following tasks for an actual or simulated excavation in a footway or carriageway of flexible construction:
 - A. Select all appropriate excavation equipment
 - B. Cut bituminous surfacing materials straight and uniformly
 - C. Check excavation is properly executed within acceptable tolerances
 - D. Check trench dimensions are correct

Specification of works

- The assessment must take place at a site that conforms to the definition of 'street' at section 48 or 'road' at section 107 of the New Roads and Street Works Act 1991.
- For each of the excavation activities listed above, the excavation must be of 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 excavating in the highway.
- 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 *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 S1.5 (*Excavation and trench categories*) refers to excavation categories.
 - ii S3.2 (*Excavation*) provides general guidelines to be followed during excavation.
 - iii Notes for Guidance NG3.2 refers to HSG 185 (*Health and Safety in Excavations*), which provides health and safety guidance to those carrying out excavations.
 - iv If working in proximity to trees is regarded as an area of risk, S1.10 (*Trees*) could be followed, which cites the guidelines of the National Joint Utilities Group publication *NJUG 10 – Guidelines for the Planning, Installation and Maintenance of Undertaker Services in Proximity to Trees*, and provides precautions to be taken during excavation activities.

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Element 3.3 Support underground apparatus during excavation

Performance criteria			
<p>You must show that:</p> <ol style="list-style-type: none"> where you identify damaged utilities' apparatus, you take appropriate action to limit further damage and then report the damage you support and protect exposed utilities' apparatus safely, using the appropriate equipment where you identify a requirement to provide safe trench sidewall support, you refer to the current relevant specifications and procedures for guidance on the action to be taken you follow safe working practices for supporting underground apparatus during excavation that are in accordance with current relevant specifications and procedures 			
Knowledge requirements	Related performance criteria		
<p>You need to know:</p> <ol style="list-style-type: none"> the different types of utilities' apparatus likely to be encountered during excavation and the implications of damage to them the action to take to report damaged utilities' apparatus the different types of support for exposed utilities' apparatus, and how to use them to support apparatus safely the appropriate equipment to use when supporting and protecting different types of exposed utilities' apparatus the circumstances in which trench sidewall support is required, and where to find the guidelines for its provision safe working practices for supporting underground apparatus during excavation 	<p>a</p> <p>a, d</p> <p>b, d</p> <p>b</p> <p>c</p> <p>all</p>		
Range to be covered			
<ol style="list-style-type: none"> You must show that appropriate equipment includes: <ol style="list-style-type: none"> slings ropes props You must show that utilities' apparatus includes: <ol style="list-style-type: none"> gas mains (plastic and metallic) water mains (plastic and metallic) sewers and drains electricity cables (high- and low-voltage) telecommunications and television cables You must show that safe working practices are: <ol style="list-style-type: none"> safe use of tools and equipment use of appropriate personal protective equipment for excavation activities, including as necessary: <table border="0"> <tr> <td> <ul style="list-style-type: none"> • high visibility jacket or waistcoat • hard hat • ear defenders • eye protection visor/goggles </td> <td> <ul style="list-style-type: none"> • dust mask • gloves • protective footwear • waterproof clothing </td> </tr> </table> use of risk assessment methods to identify and control hazards on site precautions to minimise danger or inconvenience to road users precautions to minimise danger or inconvenience to site personnel precautions to minimise damage to equipment or apparatus You must show that specifications and procedures are: <ol style="list-style-type: none"> Health and Safety Executive Guidelines (<i>HSG 185: Health and Safety in Excavations</i>) Specification for the Reinstatement of Openings in Highways 		<ul style="list-style-type: none"> • high visibility jacket or waistcoat • hard hat • ear defenders • eye protection visor/goggles 	<ul style="list-style-type: none"> • dust mask • gloves • protective footwear • waterproof clothing
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Element 3.3 Support underground apparatus during 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 for a previously excavated area of actual or simulated footway or carriageway:
 - A. Secure supporting of all utilities' apparatus as necessary.

Specification of works

- The assessment must take place at a site that conforms 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 supporting underground apparatus during 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 *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 S3.4.1 (*Side support*) states that "*the sides of all excavations in soft or loose ground shall, ordinarily, be provided with a side support system. The support system shall be properly designed and installed to restrain lateral movement of the sidewalls, and should be installed without delay.*"
 - ii S3.4.2 states that "*Supports shall be progressively withdrawn as backfilling and compaction progresses, and all voids carefully filled.*"
 - iii NG3.4 (*Side support*) states that "*where required, there must be sufficient quantities of appropriate materials available to provide safe trench support.*"

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Element 3.4 Identify, select and store excavated materials for re-use as backfill

Performance criteria	
<p>You must show that:</p> <p>a) you identify and select materials that are suitable for re-use as backfill</p> <p>b) you store re-usable materials safely and protect them from contamination and excessive drying or wetting</p> <p>c) you identify materials that are unsuitable for re-use, provide safe temporary storage for them and ensure that procedures are in place for their safe disposal</p> <p>d) you follow safe working practices for the selection of materials for re-use as backfill and for on-site storage and disposal procedures that are in accordance with current relevant specifications and procedures</p>	
Knowledge requirements	Related performance criteria
<p>You need to know:</p> <p>1 how to identify materials that are suitable and unsuitable for re-use as backfill and the circumstances in which re-use of materials is permissible</p> <p>2 how to store different types of re-usable materials safely</p> <p>3 how to protect re-usable materials from contamination and loss of fines</p> <p>4 the particular characteristics of chalk and the correct procedures for its storage and re-use</p> <p>5 how to protect re-usable materials from excessive drying or wetting during storage</p> <p>6 how to provide safe storage for materials that are unsuitable for re-use, and how to dispose of them safely</p> <p>7 the implications of using unsuitable material for backfill</p> <p>8 safe working practices for selecting materials for re-use as backfill and on-site storage and disposal procedures</p>	<p>a, c</p> <p>b</p> <p>b</p> <p>b</p> <p>b</p> <p>c</p> <p>c</p> <p>all</p>
Range to be covered	
<p>I. You must show that materials include:</p> <p>i. Class A</p> <p>ii. Class B</p> <p>iii. Class C</p> <p>iv. Class D</p> <p>v. Class E</p> <p>II. You must show that safe working practices include:</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"> • high visibility jacket or waistcoat • hard hat • ear defenders • eye protection visor/goggles • dust mask • gloves • protective footwear • waterproof clothing <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>III. You must show that specifications and procedures 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>	

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Element 3.4 Identify, select and store excavated materials for re-use as backfill

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:
 - A. Give samples of backfill materials Classes A to E.
 - B. Apply field identification tests to each sample to determine which are suitable or unsuitable.
 - C. Store materials safely and protect them from contamination and excessive drying or wetting.
 - D. Stack unsuitable materials safely on the site and ensure that procedures are in place for their safe disposal.

Specification of works

- The assessment must take place at a site that conforms 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, selecting and storing excavated materials for re-use as 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 *Specification for the Reinstatement of Openings in Highways*. The following sections of the Specification refer particularly to reusable materials.
 - i S3.3.1 indicates that *"all excavated materials that are to be re-used should be protected from excessive drying or wetting during storage. Additionally, these materials should be excavated, stored, handled and laid so as to avoid contamination and loss of fines."*
 - ii S3.3.2 indicates that any *"excavated material which is unsuitable for re-use should be removed from site as soon as practicable. Excavated material which is retained on site shall be stockpiled within the confines of site barriers, at a safe distance from the trench edge and prevented, so far as is practicable, from entering any drainage system or water course."*
 - iii S5.3.5 indicates that *"excavated chalk to be re-used as backfill shall comply with the following requirements:
 - a) Excavated chalk shall be stockpiled for re-use and shall not be subjected to multiple handling.
 - b) During wet weather, excavated chalk shall be protected against water ingress at all times."*
 - iv S6.3.4 (*Modular materials within the excavation*) indicates that *"where cobbles or setts are encountered during excavation, they may be recovered and re-used for reinstatement of the relevant layer."*
 - v S9.1 indicates that *"the re-use of excavated materials as backfill material in verges and unmade ground is to be encouraged as part of a policy of environmentally sustainable construction."*
 - vi A1.4 (*Class D – cohesive materials*) indicates that *"cohesive material at the time of compaction shall be at an appropriate moisture content between 0.8 and 1.2 times the plastic limit, or be acceptable when subjected to Field Identification Test No.2. Clays that contain insufficient moisture when excavated, or have dried excessively during site storage, as defined by Field Identification Test No.2, may only be re-used provided that they are wetted to comply with Section A1.4.1 and compacted in accordance with Appendix A8 for Class D Cohesive Materials."*

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Element 3.4 Identify, select and store excavated materials for re-use as backfill

Evidence requirements (contd.)

Additional information for candidates and assessors (contd.)

- vii A12.1 (*Interim reinstatement*) indicates that “where an interim reinstatement is required, the existing modules should be re-used, including the use of broken modules. Where damage has resulted in fragmentation or widespread breakage of modules, then bituminous material may be used for interim reinstatement, provided they meet the performance requirements of Section S2 and that compaction of such material does not result in further damage to adjacent modules.”
- viii A12.3 (*Permanent reinstatement*) indicates that “clean undamaged modules shall be re-used for permanent reinstatement; broken modules shall not be used for permanent reinstatement and shall be replaced.”
- ix NG6.3 (*Base (roadbase) reinstatement – overlaid modular layers*) indicates that the Specification “permits the re-use of cobbles and setts for the reinstatement of the relevant layer. However it is often extremely difficult to achieve a performance from such reinstatements that is similar to that of the original, well interlocked and ‘stress hardened’ layer. Failure to achieve this structure stiffness could result in failure of the reinstatement and particularly any surfacing materials laid thereon. The Specification does not permit the re-use of penning, in which the layer of modules is laid upright, in an interlocking manner, exhibiting a greater stiffness than an equivalent layer of cobbles/setts.”
- x NG7.7 (*Modular roads*) indicates that “when excavating in modular roads, the existing modules shall be lifted carefully and stored for re-use.”