Streetworks Excavation and Reinstatement (6156-23)

Qualification unit handbook for centres

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Contents

1 Introduction to the qualification

Requirements for operatives and supervisors
The New Roads and Street Works Act 1991 (NRSWA) requires work involving the installation, renewal, maintenance and inspection of underground apparatus in the highway to be under the control of competent persons. In order to comply with the Act, undertakers must ensure that (except in prescribed cases) the execution of street works is supervised by someone holding a supervisor's qualification that covers the work being undertaken. The supervisor need not be present on site at all times, but must be able to carry out their role adequately. In addition, a person holding an appropriate operative qualification must be present on the site at all times when work activities are in progress.

The Street Works qualifications for operatives and supervisors are listed below. Please note that the supervisor qualifications **do not** replace or subsume the operative qualifications: any individual wishing to undertake a supervisor's role must hold the relevant supervisors' qualifications, and a qualified operative must hold the relevant operatives' qualifications. One person **cannot** cover both an operative role and a supervisor role at the same time.

To become a qualified operative or supervisor, a candidate must gain one or more of the qualifications listed below and must hold the appropriate certificate(s) issued by one of the three Street Works awarding bodies. The qualifications of operatives and supervisors must be registered with the Street Works Qualifications Register, which is administered by SQA in Scotland (see p.24 below). In order for a person to continue to act as a qualified operative or supervisor, this registration must remain current.

Scheme Structure
Candidates wishing to become operatives or supervisors must be assessed for the qualifications that they wish to gain at an approved assessment centre in order to gain their certificates. They may be assessed for individual units or for a combination of units that form a full award, depending upon their requirements.

There are 16 units of competence for operatives and supervisors. Nine units are applicable to operatives and eight to supervisors. One of these units (unit 221) applies to both groups. The units are listed below, with units for operatives marked 'O' and supervisors' units marked 'S'.

Unit		***O/S***
221	Location and avoidance of underground apparatus	O & S
222	Signing, lighting and guarding	O
223	Excavation in the highway	O
224	Reinstatement and compaction of backfill materials	O
225	Reinstatement of sub-base and base(roadbase) in non-bituminous materials	O
226	Reinstatement of cold-lay bituminous materials	O
227	Reinstatement of hot-lay bituminous materials	O
228	Reinstatement of concrete slabs	O
229	Reinstatement of modular surfaces and concrete footways	O
230	Monitoring signing, lighting and guarding	S
231	Monitoring excavation in the highway	S

232	Monitoring reinstatement and compaction of backfill materials	S
233	Monitoring reinstatement of sub-base and base (roadbase) in non-bituminous materials	S
234	Monitoring reinstatement in bituminous materials	S
235	Monitoring reinstatement of concrete slabs	S
236	Monitoring reinstatement of modular surfaces and concrete footways	S

Unit certification is available for each Street Works unit that a candidate achieves. The achievement of various combinations of units leads to full Street Works awards. There are twelve full qualifications, which are listed below, together with the units required to achieve them.

Full Street Works Qualifications for Operatives

1 Excavation in the highway (units 221, 222 and 223 plus certificate module 925)

2 Excavation, backfilling and reinstatement of construction layers (units 221, 222, 223, 224, 225 and 226 plus certificate module 926)

3 Reinstatement of construction layers in hot-lay and cold-lay bituminous material (units 221, 222, 226 and 227 plus certificate module 927)

4 Reinstatement of concrete slabs (units 221, 222 and 228 plus certificate module 928)

5 Reinstatement of modular surfaces and concrete footways *(*units 221, 222 and 229 plus certificate module 929)

6 Signing, Lighting and Guarding (unit 222 *plus certificate module 930*)

Full Street Works Qualifications for Supervisors

7 Monitoring excavation in the highway (units 221, 230 and 231 plus certificate module 931*)*

8 Monitoring excavation, backfilling and reinstatement of construction layers with bituminous materials (units 221, 230, 231, 232, 233 and 234 plus certificate module 932)

9 Monitoring reinstatement of bituminous materials *(*units 221, 230 and 234 plus certificate module 933)

10 Monitoring reinstatement of concrete slabs *(*units 221, 230 and 235 plus certificate module 934)

11 Monitoring reinstatement of modular surfaces and concrete footways *(*units 221, 230 and 236 plus certificate module 935)

12 Monitoring Signing, Lighting and Guarding (unit 230 plus certificate module *936*)

Unit 221 Location and avoidance of underground apparatus

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to successfully locate and avoid underground utilities apparatus and highways services. The candidate will know how to interpret plans, and confirm that the plans used correspond with details of the work site. They will be able to identify the different types of underground utilities apparatus and highways services that are encountered prior to carrying out excavation, and to identify the risks and implications of damage to underground utilities apparatus and highways services. The candidate must also show that they can use pipe and cable location equipment to locate underground utilities apparatus and highways services.

Learning Outcome 1: Interpret plans showing location of underground apparatus
Assessment criteria: 1.1 inspect the work site to confirm that it corresponds with the plans 1.2 identify visual indications of services being present on the site location 1.3 identify **symbols** on plans, covering water, gas, sewers, telecommunications and electricity and **highways services** and structures 1.4 check and confirm that the information recorded on plans is accurate and current for the site

Learning Outcome 2: Understand how to interpret plans showing location of underground apparatus
Assessment criteria: 2.1 describe the criteria for checking that plans are current 2.2 identify the types of **symbols and legends** that are used on plans 2.3 identify different types of services on plans 2.4 explain the importance of marking the site clearly prior to excavation.

Learning Outcome 3: Identify utilities apparatus and highways services encountered during excavation
Assessment criteria: 3.1 identify the underground **utilities apparatus** on the site 3.2 identify the **highways services** on the site 3.3 identify damage to **utilities apparatus** and **highways services**.

Learning Outcome 4: Understand how to identify types of utilities apparatus and highways services encountered during excavation
Assessment criteria: 4.1 identify the different types of underground **utilities apparatus** 4.2 identify the different types of **highways services** 4.3 describe the distinguishing characteristics of different types of underground **utilities apparatus** 4.4 describe the distinguishing characteristics of different types of **highways services**.

Learning Outcome 5: Identify the risks and implications of damage to underground utilities apparatus and highways services
Assessment criteria: 5.1 carry out a risk assessment on **utilities apparatus** and **highways services** on site 5.2 ensure that contingency plans are in place in case of damage occurring to **utilities apparatus** and **highways services**.

Learning Outcome 6: Understand the risks and implications of damage to underground utilities apparatus and highways services
Assessment criteria: 6.1 identify the elements in a risk assessment on **utilities apparatus** and **highways services** 6.2 identify damage to different types of underground **utilities apparatus** and **highways services** 6.3 explain the **implications of damage** to different types of underground **utilities apparatus** and **highways services** 6.4 explain how to minimise the effects of damage to underground **utilities apparatus** and **highways services** 6.5 describe the content of contingency plans in relation to damaged underground apparatus.

Learning Outcome 7: Use pipe and cable location equipment
Assessment criteria: 7.1 select **equipment** for the pipe and cable location activity 7.2 check that the **equipment** to be used is fit for purpose 7.3 prepare **equipment** for use 7.4 complete the search procedures to locate underground **utilities apparatus** 7.5 interpret the results of search procedures accurately 7.6 mark the site clearly showing the location of services found using cable and pipe location **equipment** 7.7 compare the results of searches undertaken with the information on the site plans.

Learning Outcome 8: Understand the use of pipe and cable location equipment
Assessment criteria: 8.1 describe the operational limitations of different pipe and cable location **equipment** 8.2 explain how to select **equipment** that is fit for purpose 8.3 explain the procedure for notifying the relevant authority of discrepancies between search results and site plans 8.4 explain the procedure to follow where underground **utilities apparatus** cannot be found using pipe and cable location **equipment**.

Learning Outcome 9: Follow safe working practices
Assessment criteria: 9.1 follow current relevant health and safety **regulations, standards and other legislation** relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 9.2 identify the current relevant health and safety **regulations, standards and other legislation** that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out

221: Evidence Requirements/Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Utilities apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains (c) sewers and drains (d) low- and high-voltage electricity cables (e) telecommunications and television cables (f) optic fibre. 2. **Highways services** includes: (a) highway drainage (b) culverts (c) land drains (d) highways/road with special engineering controls. 3. The **symbols and legends** must cover a minimum of three of the following types: (a) water (b) gas (c) sewers (d) telecommunications (e) electricity. 4. Safe **working practices** may include: (a) safe use of tools and equipment (b) use of PPE , including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor/goggles, dust mask (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 5. **Regulations, standards and other legislation** include: (a) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (b) Health and Safety Guidance 150, *Health and Safety in Construction*. 6. Potential **implications of damage** to underground utilities' apparatus include: (a) health and safety hazards (including personal injury and dangerous situations) (b) disruption of service (c) disruption of traffic. 7. **Equipment** used when locating pipes and cables includes: (a) proprietary pipe and cable location equipment (b) suitable marking equipment (c) personal protective equipment.

221: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 222 Signing, lighting and guarding

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to successfully sign, light and guard a work site. The candidate will be able to survey the work site to put in place suitable provision for the site location requirements, ensuring the safe passage of pedestrians and site personnel, the safety of vehicular traffic, provision for any special needs, including cyclists and horse riders, and provision for vehicles and plant in the working area. They will be able to put in place suitable equipment to protect pedestrians, vehicular traffic and site personnel, and will be able to provide and control portable traffic signals and Stop/Go traffic control in line with site location requirements and traffic conditions.

Candidates undertaking this unit must use the current version of *Safety at Street Works and Road* Works: A Code of Practice.

Learning Outcome 1: Survey the work site
Assessment criteria: 1.1 carry out a survey of the work site and risk assessment, in accordance with Health and Safety regulations and requirements, to determine footways, traffic lanes and safety zones 1.2 identify provision for the **requirements of the site location** 1.3 identify provision for the safe passage of pedestrians 1.4 identify ways to minimise disruption to and ensure the safety of vehicular traffic 1.5 identify provision for any **special needs** 1.6 produce a plan and **equipment** list that makes provision for vehicles and plant within the confines of the working area.

Learning Outcome 2: Understand how to survey the work site
Assessment criteria: 2.1 describe the purpose of a work site survey and risk assessment 2.2 explain the potential **requirements of the site location** when signing, lighting and guarding the site 2.3 identify the factors that affect provision for: (a) the safe passage of pedestrians (b) potential requirements of people with **special needs** (c) vehicles and plant within the working area 2.4 identify how to minimise disruption to and ensure the safety of vehicular traffic.

Learning Outcome 3: Protect pedestrians, vehicular traffic and site personnel
Assessment criteria: 3.1 select and use personal protective equipment required for the task 3.2 create footways, traffic lanes and safety zones to provide for: (a) the requirements of the site location (b) the safe passage of pedestrians (c) minimising disruption to and ensuring safety of vehicular traffic (d) identified **special needs** 3.3 control the movement of pedestrians, vehicles and plant within the confines of the working area 3.4 select **equipment** that meets the **requirements of the site location** and any **special needs** 3.5 check that the **equipment** to be used is fit for purpose 3.6 position and remove **equipment** according to the specified sequence.

Learning Outcome 4: Understand how to protect pedestrians, vehicular traffic and site personnel
Assessment criteria: 4.1 identify the personal protective equipment required for signing, lighting and guarding activities 4.2 explain how to control the movement of pedestrians, vehicles and plant within the confines of the working area 4.3 identify distances and dimensions to accommodate advance signing, 4.4 identify distances and dimensions to accommodate pedestrian walkways, traffic lanes and safety zones 4.5 explain how to check that **equipment** is fit for purpose 4.6 identify the specified sequences for positioning and removing **equipment**.

Learning Outcome 5: Provide portable traffic signals and Stop/Go traffic control
Assessment criteria: 5.1 inspect and test **signals** for correct operation 5.2 position **signals** to meet the site location requirements 5.3 position **signals** in the correct sequence 5.4 adjust signal controls to suit traffic conditions 5.5 dismantle and remove **signals** in the correct sequence 5.6 install and remove Stop/Go traffic control.

Learning Outcome 6: Understand how to provide portable traffic signals, Stop/Go and priority traffic control
Assessment criteria: 6.1 describe how to check that **signals** are operating correctly 6.2 explain how the site location requirements affect the positioning of **signals** 6.3 identify the implications of using an incorrect sequence for positioning **signals** 6.4 explain how the traffic conditions affect the adjustment of signal controls 6.5 describe the site conditions for using Stop/Go boards 6.6 describe the site conditions for using priority traffic control 6.7 describe the site conditions for using Give and Take and Stop Works traffic control.

Learning Outcome 7: Follow safe working practices
Assessment criteria: 7.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 7.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out.

222: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Requirements of the site location** include: (a) proximity to schools and hospitals (b) users of the route (including those with special needs) (c) weather conditions (including icy roads, heavy rain, snow, fog) (d) volume of traffic (e) speed of traffic (f) lighting on highways (g) highway situations (including lack of footways; pedestrianized areas; emergency service access; width of traffic lanes, footways and safety zones; inadequate lane widths; serious congestion; private access; bus stops, parking places, obstruction of driver's view at bends and summits; roundabouts and junctions; footways, ramps, boards and road plates; railway level crossings; tramways; cycle lanes and cycle tracks) (h) different requirements for working at day and night (i) mobile works and minor works (j) the safety zone (length of lead-in taper of cones (T); sideways clearance (S); longways clearance (L); length of exit taper of cones) (k) distances and dimensions and sizes for advance signing, traffic lanes, walkways and safety zones. 2. Those with **special needs** include: (a) visually impaired people (b) people with disabilities (c) users of prams and pushchairs (d) users of wheelchairs and other physically impaired people (e) cyclists (f) young children (g) horse riders. 3. Safe **working practices** may include: (a) safe use of tools and equipment (b) use of PPE including, as necessary: high visibility clothing, hard hat, gloves, protective footwear, waterproof clothing (c) precautions to minimise danger or inconvenience to road users (d) precautions to minimise danger or inconvenience to site personnel (e) precautions to minimise damage to equipment or apparatus. 4. **Equipment** may include as necessary: (a) adequate range of signing, lighting and guarding equipment (including signs, cones, lamps, footway boards, barriers) (b) high visibility safety equipment (c) suitable materials to construct ramps or proprietary ramps used. 5. **Signals** include: (a) proprietary two-way electrical or engine powered portable traffic lights (b) set of Stop/Go boards.

222: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. For safety reasons, observed assessments of candidates undertaking signing, lighting and guarding activities must take place at a centre, or a location linked to a centre, that has been approved by the centre's external verifier prior to use for assessment. The site used for assessment must be a real road with unpredictable traffic flows. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 223 Excavation in the highway

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to carry out excavation in the highway. The candidate will be able to identify the characteristics of different types of footway and carriageway, and their construction layers. They will be able to excavate safely, in line with the relevant specifications and codes of practice, and will show that they can support underground apparatus that they encounter during excavation. The candidate will also be able to identify, select and store excavated material that can be re-used as backfill.

Learning Outcome 1: Understand how to Identify different types of footway and carriageway
Assessment criteria: 1.1 identify the main **types of footway and carriageway** in accordance with current relevant specifications 1.2 describe the characteristics of the main **types of footway and carriageway** structure 1.3 describe the characteristics of a high duty or high amenity footway, footpath or cycle track 1.4 describe how to distinguish between different **types of footway and carriageway** 1.5 identify different **construction layers** in the main **types of footway and carriageway** in accordance with current relevant specifications.

Learning Outcome 2: Excavate in the highway
Assessment criteria: 2.1 identify the type of footway or carriageway to be excavated 2.2 select **equipment** required for the excavation activity 2.3 check that the **equipment** to be used is fit for purpose 2.4 excavate materials at all **construction layers** according to specifications 2.5 use working methods that minimise the risk of reinstatement failure 2.6 excavate trenches to the specified dimensions.

Learning Outcome 3: Understand how to excavate in the highway
Assessment criteria: 3.1 describe the types of **equipment** required for excavation activities 3.2 explain how to select **equipment** that is fit for purpose 3.3 identify the specifications for excavating trenches 3.4 explain how to identify areas of high risk for excavation activities 3.5 describe the precautions to take when excavating in **high risk areas** 3.6 describe working methods that minimise the risk of reinstatement failure 3.7 describe the differences between shallow excavations, deep openings, narrow trenches and small excavations 3.8 explain how to ensure excavations can accommodate for subsequent reinstatement.

Learning Outcome 4: Support underground utilities apparatus during excavation
Assessment criteria: 4.1 identify damage to **utilities apparatus** and take remedial action to limit further damage 4.2 report damaged apparatus to the relevant person 4.3 use suitable equipment to support and protect exposed **utilities apparatus**.

Learning Outcome 5: Understand how to support underground apparatus during excavation
Assessment criteria: 5.1 explain the implications of damage to the different types of underground **utilities apparatus** 5.2 state the person to whom damaged **utilities apparatus** should be reported 5.3 describe the different types of support for exposed **utilities apparatus** 5.4 explain how to use different types of equipment to support and protect apparatus safely 5.5 describe the circumstances in which trench sidewall support is required, and where to find the guidelines for its provision.

Learning Outcome 6: Identify, select and store excavated materials for re-use as backfill
Assessment criteria: 6.1 identify and select **excavated materials** that are suitable for re-use as backfill or sub-base 6.2 store re-usable materials safely and protect them from contamination and excessive drying or wetting 6.3 identify materials that are not suitable for re-use and provide safe temporary storage for them.

Learning Outcome 7: Understand how to identify, select and store excavated materials for re-use as backfill
Assessment criteria: 7.1 describe **excavated materials** that are suitable and unsuitable for re-use as backfill 7.2 describe the storage requirements for different types of re-usable materials 7.3 explain how to protect stored re-usable from: (a) contamination (b) loss of fines (c) excessive drying or wetting 7.4 describe the correct procedures for storage and re-use of chalk 7.5 describe how to safely store and dispose of materials that are unsuitable for re-use 7.6 explain the implications of using unsuitable material for backfill or sub-base.

Learning Outcome 8: Follow safe working practices
Assessment criteria: 8.1 follow current relevant health and safety **regulations, standards and other legislation** relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 8.2 identify the current relevant health and safety **regulations, standards and other legislation** that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out.

223: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Types of footway and carriageway** include: (a) flexible footway and carriageway (b) modular footway and carriageway (c) rigid footway and carriageway (d) composite carriageway. 2. **Construction layers** in footways and carriageways include: (a) surface course (b) binder course (c) base (roadbase) (d) sub-base (e) blocks or sett (f) slab (g) bed. 3. **Regulations, standards and other legislation** includes: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 4. Suitable **equipment** may include as necessary: (a) appropriate hand tools – including square and round mouth shovels (b) appropriate powered equipment – including pavement saw and breaking-out tools (c) appropriate equipment for supporting exposed utilities – including slings, ropes and props. 5. Safe **working practices** may include: (a) safe use of tools and equipment (b) use of appropriate PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 6. **Utilities apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains (c) sewers and drains (d) high- and low-voltage electricity cables (e) telecommunications and television cables. 7. **Excavated materials** described in specifications include: (a) Class A (b) Class B

(c) Class C
(d) Class D
(e) Class E.

8. **High risk areas** include:
(a) utilities apparatus
(b) in close proximity to trees
(c) Bad ground conditions
(d) special engineering difficulty.

223: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 224 Reinstatement and compaction of backfill material

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to backfill an excavation. The candidate will be able to identify the different types of footway and carriageway, and their construction layers, to select appropriate materials for use as backfill, and to backfill the excavation safely to the correct level. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Understand how to identify different types of footway and carriageway
Assessment criteria: 1.1 identify the main **types of footway and carriageway** in accordance with current relevant **specifications** 1.2 describe characteristics of the main **types of footway and carriageway** 1.3 describe characteristics of a high duty or high amenity footway, footpath or cycle track 1.4 describe how to distinguish between different **types of footway and carriageway** 1.5 identify different **construction layers** in the main **types of footway and carriageway** in accordance with current relevant **specifications**.

Learning Outcome 2: Select materials for backfill
Assessment criteria: 2.1 identify the type of footway or carriageway to be reinstated 2.2 identify and select excavated **materials** that are suitable for backfill 2.3 calculate the quantities of **materials** required for the reinstatement 2.4 store re-usable **materials** safely and protect them from excessive drying or wetting 2.5 Identify imported **materials** that are suitable for use as backfill 2.6 unload and provide safe storage for imported **materials** 2.7 identify the correct backfill **materials** to use in **high risk areas** 2.8 store **materials** on site without obstructing or damaging essential facilities and street furniture.

Learning Outcome 3: Understand how to select materials for backfill
Assessment criteria: 3.1 describe different types of excavated **materials** and their suitability for use as backfill 3.2 describe different types of imported **materials** and their suitability for use as backfill 3.3 describe correct storage arrangements for backfill **materials** 3.4 describe backfill **materials** that are suitable as surround to **utilities apparatus** 3.5 explain the implications of using unsuitable material for backfill 3.6 describe correct backfill **materials** to use in **high risk areas** 3.7 explain how to minimise the obstruction of essential facilities and damage to street furniture.

Learning Outcome 4: Backfill the excavation
Assessment criteria: 4.1 select reinstatement and compaction **equipment** that: (a) is suitable to the material type and trench dimensions (b) avoids damage to underground **utilities apparatus** (c) is in working condition and safe to use 4.2 reinstate the backfill layer to the correct level 4.3 complete backfilling without damaging underground **utilities apparatus** 4.4 compact backfill **materials** to provide a firm base for advancement and minimise the risk of reinstatement failure.

Learning Outcome 5: Understand how to backfill an excavation
Assessment criteria: 5.1 explain the factors that influence the selection of reinstatement and compaction **equipment t**o suit the material type and trench dimensions 5.2 describe types of **equipment** that will minimise the potential for damage to underground **utilities apparatus** 5.3 state the level of backfill layer required for different pavement types 5.4 state the amount of compaction required for each layer using specific **equipment**.

Learning Outcome 6: Dispose of surplus materials
Assessment criteria: 6.1 identify **materials** that are unsuitable for re-use or surplus to requirements 6.2 store surplus **materials** and those unsuitable for re-use in safe temporary storage 6.3 ensure that **materials** for disposal are loaded safely for transportation.

Learning Outcome 7: Understand how to dispose of surplus materials
Assessment criteria: 7.1 explain how to determine whether excavated **materials** are unsuitable for re-use or are surplus to requirements 7.2 explain the importance of storing unsuitable and re-usable **materials** separately 7.3 describe how to load **materials** safely for transportation 7.4 explain when surplus **materials** should be removed from site.

Learning Outcome 8: Follow safe working practices
Assessment criteria: 8.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 8.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 8.3 leave the site in a clean and safe condition 8.4 describe how to leave the site in a clean and safe condition.

224: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Types of footway and carriageway** include: (a) flexible footway and carriageway (b) modular footway and carriageway (c) rigid footway and carriageway (d) composite carriageway. 2. **Construction layers** in footways and carriageways include: (a) surface course (b) binder course (c) base (roadbase) (d) sub-base (e) block or sett (f) slab (g) bed. 3. **Specifications** and procedures include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 4. **Materials** encountered during reinstatement include: (a) Class A (b) Class B (c) Class C (d) Class D (e) Class E. 5. Safe **working practices** may include: (a) safe use of tools and equipment (b) use of appropriate PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 6. **Equipment** for reinstatement may include as necessary: (a) appropriate hand tools – including square mouth shovel, tape measure, travelling site stick or depth-gauge and hard bristle brooms. (b) appropriate powered equipment – including vibrotamper or vibrating plate, percussive rammer and vibrating roller. 7. **Utilities apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains

(c) sewers and drains
(d) high- and low-voltage electricity cables
(e) telecommunications and television cables.

8. **High risk areas** includes:
(a) as a surround to utilities' apparatus
(b) in close proximity to trees
(c) bad ground conditions
(d) special engineering difficulty.

224: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 225 Reinstatement of sub-base and roadbase in non-bituminous materials

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to reinstate sub-base and roadbase in non-bituminous materials. The candidate will be able to prepare the subgrade to receive subsequent layers, to identify and select materials to be used for the reinstatement, and to reinstate the sub-base or roadbase correctly, using the correct equipment. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Prepare the backfill layer to receive subsequent layers
Assessment criteria: 1.1 remove loose and unacceptable **materials** from the area to be reinstated using suitable **equipment** 1.2 identify and make good backfill layer defects using approved **materials** and suitable **equipment** 1.3 use **equipment** to check and confirm that the backfill layer is suitable to accept subsequent reinstatement.

Learning Outcome 2: Understand how to prepare the backfill layer for subsequent layers
Assessment criteria: 2.1 explain why loose and unacceptable **materials** are removed from the area to be reinstated 2.2 describe how to remove loose and unacceptable **materials** from the area to be reinstated 2.3 state the purpose of the sub-base and roadbase layer construction 2.4 describe potential backfill layer defects and the **equipment**, **materials** and methods used to repair them 2.5 explain the implications of leaving backfill layer defects.

Learning Outcome 3: Select and store materials for sub-base and roadbase
Assessment criteria: 3.1 identify and select excavated **materials** that are suitable for re-use or disposal 3.2 identify imported **materials** suitable for use in sub-base and roadbase 3.3 unload imported **materials** safely on site 3.4 store all **materials** safely on site to prevent degradation.

Learning Outcome 4: Understand how to select materials for sub-base and roadbase
Assessment criteria: 4.1 describe different types of excavated and imported **materials** and their suitability for use in reinstating sub- base and roadbase 4.2 describe the permitted range of alternative reinstatement materials (ARMs), stabilised materials for fill (SMFs) and other materials for use as surround to **apparatus** 4.3 describe how to store **materials** on site to prevent degradation 4.4 describe how to unload and store imported **materials** safely on site 4.5 explain how to minimise the obstruction of essential facilities and damage to street furniture.

Learning Outcome 5: Reinstate the sub-base and roadbase layers
Assessment criteria: 5.1 select reinstatement **equipment** that is: (a) suitable to the material type and trench dimensions (b) in working condition and safe to use 5.2 identify the level to which the sub-base and roadbase layers should be reinstated 5.3 reinstate the sub-base and roadbase layers to the specified level using the correct quantities of **materials** 5.4 calculate the **materials** required to achieve full compaction of the layer construction 5.5 use selected compaction **equipment** to adequately compact the **materials** and layer thickness 5.6 complete the sub-base and roadbase layer construction to **specifications**.

Learning Outcome 6: Understand how to reinstate the sub-base and roadbase layers
Assessment criteria: 6.1 explain the factors that affect the selection of **equipment** for the prescribed operation and material type 6.2 explain how to measure the specified level of each layer 6.3 describe how to check that the sub-base and roadbase layer construction is completed to **specifications**.

Learning Outcome 7: Dispose of surplus materials
Assessment criteria: 7.1 identify **materials** that are unsuitable for re-use or surplus to requirements 7.2 store surplus **materials** and those unsuitable for re-use in safe temporary storage 7.3 ensure **materials** for disposal are loaded safely for transportation.

Learning Outcome 8: Understand how to dispose of surplus materials
Assessment criteria: 8.1 explain how to identify **materials** that are unsuitable for re-use or surplus to requirements 8.2 explain the importance of storing unsuitable and re-usable **materials** separately 8.3 describe how to load **materials** safely for transportation 8.4 explain when surplus **materials** should be removed from site.

Learning Outcome 9: Follow safe working practices
Assessment criteria: 9.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 9.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 9.3 leave the site in a clean and safe condition 9.4 describe how to leave the site in a clean and safe condition.

225: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Equipment** includes: (a) Hand tools – including square and round mouth shovels, hand pick, hard bristle broom, measuring tape, hand rammer or depth gauge (b) powered equipment – including vibrotamper, vibrating plate, percussive rammer and vibrating roller. 2. Safe **working practices** include: (a) safe use of tools and equipment (b) PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 3. **Specifications** and procedures include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 4. **Materials** identified for reinstating sub-base and roadbase include: (a) Granular Type 1 sub-base material (b) excavated granular sub-base material Class A (c) category 3 cement-bound material (CBM3) (d) foamed concrete. 5. **Materials** for disposal include: (a) unsuitable surplus materials (b) surplus materials that are suitable for re-use. 6. Utilities **apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains (c) sewers and drains (d) high- and low-voltage electricity cables (e) telecommunications and television cables.

225: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 226 Reinstatement in cold-lay bituminous materials

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to carry out reinstatement using cold-lay bituminous surfacing material. The candidate will be able to prepare the pavement layer to receive cold-lay surfacing materials, to identify and select materials to be used for the reinstatement, and to construct the cold-lay bituminous surfacing layer, using the correct equipment. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Prepare the layer of pavement structure to receive permanent cold-lay surfacing materials
Assessment criteria: 1.1 remove loose and unacceptable **materials** from the area to be reinstated using suitable **equipment** 1.2 identify and rectify any pavement layer surface contamination or defect 1.3 use suitable **equipment** to trim back edges where damage has occurred 1.4 use suitable **equipment** to re-position displaced ironwork, kerbs and edge restraints in accordance with established levels 1.5 confirm against the **specifications** that the correct depth is left for the cold-lay surface material.

Learning Outcome 2: Understand how to prepare the layer of pavement structure to receive cold-lay surfacing materials
Assessment criteria: 2.1 explain why loose and unacceptable **materials** are removed from the area to be reinstated 2.2 explain how surface and ground water should be controlled from excavations 2.3 explain the implications of pavement layer surface contamination or defects 2.4 explain how to identify and rectify pavement layer surface contamination or defects 2.5 explain how to identify and rectify edge damage and undercut 2.6 describe how to re-position displaced ironwork, kerbs and edge restraints 2.7 explain how to check and confirm that the pavement layer construction is correct 2.8 explain the implications of incorrect pavement layer construction.

Learning Outcome 3: Construct a cold-lay bituminous surfacing layer
Assessment criteria: 3.1 check that imported bituminous material complies with the specification 3.2 select compaction **equipment** and ensure that it is (a) suitable for the operation (b) in working condition and safe to use 3.3 spread and level cold-lay bituminous material in binder course and surface course layers 3.4 handle cold-lay bituminous material correctly 3.5 store cold-lay bituminous material to prevent contamination, oxidation and wetting 3.6 reinstate around highway iron work according to the specification 3.7 seal edges of the cavity using specified edge sealant 3.8 compact the bituminous material according to the specification.

Learning Outcome 4: Understand how to construct a cold-lay bituminous surfacing layer
Assessment criteria: 4.1 explain the factors that influence the selection of **equipment** for the prescribed operation 4.2 explain how to check **equipment** is in working condition and safe to use 4.3 describe handling and storage **procedures** for cold-lay bituminous material 4.4 explain the reasons for sealing cavity edges before placing surface layers 4.5 explain how to determine required surcharge prior to compaction of cold-lay surfacing **materials** 4.6 explain compaction **procedures** for cold-lay bituminous material 4.7 describe how to confirm that the compacted layer thickness meets **specifications**.

Learning Outcome 5: Dispose of surplus materials
Assessment criteria: 5.1 identify **materials** that are unsuitable for re-use or surplus to requirements 5.2 store surplus **materials** and those unsuitable for reuse in safe temporary storage 5.3 ensure **materials** for disposal are loaded safely for transportation.

Learning Outcome 6: Understand how to dispose of surplus materials
Assessment criteria: 6.1 explain how to identify **materials** that are unsuitable for re-use or surplus to requirements 6.2 explain the importance of storing unsuitable and re-usable **materials** separately 6.3 describe how to load **materials** safely for transportation 6.4 explain when surplus **materials** should be removed from site.

Learning Outcome 7: Follow safe working practices
Assessment criteria: 7.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out. 7.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 7.3 leave the site in a clean and safe condition 7.4 describe how to leave the site in a clean and safe condition.

226: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Equipment** includes: (a) Hand tools – including square and round mouth shovels, hand pick, hard bristle broom, profile gauge and measuring tape (b) powered equipment – including breakout equipment, road saw, disc cutter, vibrotamper, vibrating roller or vibrating plate and Turk's head brush. 2. Safe **working practices** include: (a) safe use of tools and equipment (b) PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 3. **Specifications** and **procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 4. **Materials** identified for reinstating a cold-lay bituminous surfacing layer include: (a) deferred set mixtures for reinstatement (b) permanent cold-lay binder and surfacing materials (c) cold edge sealant. 5. **Materials** for disposal include: (a) unsuitable surplus materials (b) surplus materials that are suitable for re-use.

226: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 227 Reinstatement in hot-lay bituminous materials

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to carry out reinstatement using hot-lay bituminous surfacing material. The candidate will be able to prepare the pavement layer to receive hot-lay surfacing materials, to identify and select materials to be used for the reinstatement, and to construct the hot-lay bituminous binder course and the asphalt surface course, using the correct equipment. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Prepare the layer of pavement structure to receive hot-lay surfacing materials	
Assessment criteria:	
1.1	use suitable **equipment** to remove interim reinstatement material to the correct depth
1.2	remove loose and unacceptable **materials** from the area to be reinstated using suitable **equipment**
1.3	identify and rectify any pavement layer surface contamination or defects
1.4	use suitable **equipment** to trim back edges where damage has occurred
1.5	use suitable **equipment** to re-position displaced ironwork, kerbs and edge restraints in accordance with established levels
1.6	confirm against the **specifications** that the correct depth is left for the hot-lay surface material.

Learning Outcome 2: Understand how to prepare the layer of pavement structure to receive hot-lay surfacing materials	
Assessment criteria:	
2.1	describe **equipment** to use for removing interim reinstatement material
2.2	explain how to check that interim reinstatement material is removed to the correct depth
2.3	explain why loose and unacceptable **materials** are removed from the area to be reinstated
2.4	describe how to remove loose and unacceptable **materials** from the area to be reinstated
2.5	explain the implications of pavement layer surface contamination or defects
2.6	explain how to identify and rectify pavement layer surface contamination or defects
2.7	explain how to identify and rectify edge damage and undercut
2.8	describe how to re-position displaced ironwork, kerbs and edge restraints
2.9	explain the implications of incorrect pavement layer construction.

Learning Outcome 3: Construct the bituminous binder course
Assessment criteria: 3.1 confirm the delivery temperature of hot-lay bituminous material prior to laying 3.2 select compaction **equipment** and ensure that it is (a) suitable for the operation (b) in working condition and safe to use 3.3 maintain specialist tools at the correct temperature for working with hot bituminous material 3.4 seal the edges according to the specification 3.5 select, spread and level hot bituminous material binder course 3.6 handle hot-lay bituminous material correctly 3.7 store hot-lay bituminous material correctly 3.8 compact the hot bituminous material according to the specification.

Learning Outcome 4: Understand how to construct a bituminous base (roadbase) and binder course
Assessment criteria: 4.1 describe quality requirements of the selected material 4.2 explain why it is important to use hot-lay bituminous material at the correct temperature 4.3 explain why it is important to maintain tool temperatures when working with hot-lay bituminous **materials** 4.4 describe how to spread and level bituminous material in base (roadbase) and/or binder course and surface course layers 4.5 explain the factors that influence the selection of **equipment** for the prescribed operation 4.6 explain how to select hand tools and compaction **equipment** for the prescribed operation 4.7 explain how to check that **equipment** is in working condition and safe to use 4.8 describe handling and storage **procedures** for hot-lay bituminous material 4.9 explain the reasons for sealing cavity edges before placing surface layers 4.10 explain compaction **procedures** for hot-lay bituminous material 4.11 describe how to confirm that compacted layer thickness meets **specifications**.

Learning Outcome 5: Construct the asphalt surface course
Assessment criteria: 5.1 apply tack coat as necessary 5.2 check the temperature of hot bituminous material before laying it 5.3 maintain specialist tools at the correct temperature for working with bituminous material 5.4 handle hot-lay bituminous material correctly 5.5 store hot-lay bituminous material correctly 5.6 use suitable **equipment** to select, spread and level hot bituminous material in a surface course layer 5.7 select compaction **equipment** that is in working condition and safe to use 5.8 compact the hot-lay bituminous material according to the specification 5.9 make adequate provision for skid resistance and texture depth in the surface course.

Learning Outcome 6: Understand how to construct an asphalt surface course
Assessment criteria: 6.1 explain the correct **procedures** and requirements for applying tack coat 6.2 describe the quality requirements for the selected material 6.3 explain why it is important to use hot-lay bituminous material at the correct temperature 6.4 explain why it is important to maintain tool temperatures when working with hot-lay bituminous **materials** 6.5 describe how to spread and level bituminous material in an asphalt surface course layer 6.6 explain the factors that influence the selection of **equipment** for the prescribed operation 6.7 describe handling and storage **procedures** for hot-lay bituminous material 6.8 explain how to check that **equipment** is in working condition and safe to use 6.9 explain compaction **procedures** for hot-lay bituminous material 6.10 explain the method used to ensure skid resistance and texture depth from **specifications**.

Learning Outcome 7: Dispose of surplus materials
Assessment criteria: 7.1 identify **materials** that are unsuitable for re-use or surplus to requirements 7.2 store surplus **materials** and those unsuitable for reuse in safe temporary storage 7.3 ensure **materials** for disposal are loaded safely for transportation

Learning Outcome 8: Understand how to dispose of surplus materials
Assessment criteria: 8.1 explain how to identify **materials** that are unsuitable for re-use or surplus to requirements 8.2 explain the importance of storing unsuitable and re-usable **materials** separately 8.3 describe how to load **materials** safely for transportation 8.4 explain when surplus **materials** should be removed from site.

Learning Outcome 9: Follow safe working practices for locating and avoiding underground apparatus and highways services
Assessment criteria: 9.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out. 9.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out. 9.3 leave the site in a clean and safe condition 9.4 describe how to leave the site in a clean and safe condition.

227: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Equipment** includes: (a) Hand tools – including square and round mouth shovels, hand pick, hard bristle broom, profile board, measuring tape, rake hot hand tamper, tool heater, wheelbarrow, water butt, probe thermometer, bitumen bucket, edge seal applicator, Turk's head brush. (b) powered equipment – including breakout equipment, pavement saw, vibrotamper, vibrating roller or vibrating plate, disc cutter, road saw 2. Safe **working practices** include: (a) safe use of tools and equipment (b) PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus (g) safe working practices for working with molten bitumen (h) personal hygiene measures in connection with skin contamination. 3. **Specifications** and **procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 4. **Materials** identified for constructing a bituminous binder course include: (a) dense binder course materials (20mm nominal stone size), hot rolled asphalt 50/20 binder course (b) close graded surface course materials (10mm stone size), hot rolled asphalt 30/14 surface course. *(Note: In small excavations and narrow trenches, the preferred binder course mixture may be replaced by any surface course mixture given in the Specification, for the respective road Type, provided the same mixture is used as the surface course.)* 5. **Materials** identified for constructing an asphalt concrete surface course to BS EN 13108 and PD 6691 in accordance with specifications to include: (a) hot rolled asphalt binder and surface course (b) close graded surface course materials (10mm stone size) (c) asphalt concrete dense surface course (d) stone mastic asphalt surface and binder course (e) pre-coated 14mm or 20mm chippings (f) edge sealants (g) tack coat. 6. **Materials** for disposal include: (a) unsuitable surplus materials

(b) surplus materials that are suitable for re-use.

7. **Procedures** for handling, transportation and laying of asphalt concrete in accordance with specifications BS 594987 and PD 6691. *(Note: These standards and documents replace earlier ones and should be used in conjunction with the BS EN 13108.)*.

227: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 228 Reinstatement of concrete slabs

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to carry out the reinstatement of a concrete slab. The candidate will be able to prepare the sub-base to receive the concrete slab, to prepare the edges of the existing slab for concrete reinstatement, to lay mesh reinforcement, and to form the concrete slab, using the correct equipment. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Prepare sub-base to receive concrete slab
Assessment criteria: 1.1 remove loose and unacceptable **materials** from the area to be reinstated using suitable **equipment** 1.2 make good any defects in the sub-base using specified materials 1.3 select sub base compaction **equipment** and ensure that it is (a) suitable for the operation (b) in working conditions and safe to use 1.4 compact the sub base according to specification 1.5 check that the finished sub-base level accommodates the correct slab thickness.

Learning Outcome 2: Understand how to prepare sub-base to receive concrete slab
Assessment criteria: 2.1 explain why loose and unacceptable **materials** are removed from the area to be reinstated 2.2 describe how to remove loose and unacceptable **materials** from the area to be reinstated 2.3 identify different sub-base defects that could be encountered 2.4 identify approved **sub-base materials** for replacing unacceptable materials 2.5 describe the **procedures** for replacing defective **sub-base materials** with approved materials 2.6 explain the factors that influence the selection of sub base compaction **equipment** for the prescribed operation 2.7 explain how to check that **equipment** is in working condition and safe to use 2.8 explain how to check that the **sub-base material** is adequately compacted 2.9 explain how to ensure the cavity depth will accommodate the specified slab thickness.

Learning Outcome 3: Prepare the edges of existing slab to receive concrete reinstatement
Assessment criteria:
3.1 saw-cut the edge of the existing slab according to the specification, using the appropriate **equipment**
3.2 prepare the unsawn section of the exposed slab edge according to the specification to form a **support** using steel dowel bars
3.3 place the slip membrane in position and overlap it
3.4 clean and wet all edges prior to placing the concrete.

Learning Outcome 4: Understand how to prepare the edges of existing slab to receive concrete reinstatement
Assessment criteria:
4.1 describe how to saw-cut the edge of an existing slab correctly
4.2 explain how to rough-cut the unsawn section of the exposed slab edge to form a taper-edge **support**.
4.3 explain how to provide **support** for concrete slab reinstatement using dowel bars including (a) how to drill the unsawn section to provide a sliding fit for dowel bars (b) the diameter and length of dowel bars required for the reinstatement (c) how to cut and position dowel bars
4.4 explain the problems that may be caused by not placing slip membranes in accordance with **specifications**
4.5 explain the importance of cleaning and wetting the edges of the existing slab prior to the placement of concrete.

Learning Outcome 5: Lay mesh reinforcement
Assessment criteria:
5.1 expose the existing **mesh reinforcement**
5.2 select new **mesh reinforcement** to match the existing reinforcement
5.3 cut the **mesh reinforcement** to the correct size, including the required overlap
5.4 tie the new **mesh reinforcement** securely to the existing reinforcement.

Learning Outcome 6: Understand how to lay mesh reinforcement
Assessment criteria:
6.1 describe the minimum length of the existing reinforcement to expose, and when to use further trimming
6.2 explain the factors that influence the selection of **mesh reinforcement**
6.3 describe **procedures** for measuring and cutting **mesh reinforcement**
6.4 explain how to position new reinforcement and attach it to existing reinforcement

Learning Outcome 7: Form concrete slab
Assessment criteria: 7.1 replace missing or damaged **joints** to match existing **joints** 7.2 carry out slump testing of concrete to confirm workability 7.3 place concrete to a uniform level according to the specification 7.4 compact the concrete using suitable **equipment** to achieve maximum density 7.5 finish the concrete surface to the approved texture to ensure skid resistance 7.6 apply an approved curing membrane.

Learning Outcome 8: Understand how to form concrete slab
Assessment criteria: 8.1 identify the **types of carriageway** on which concrete reinstatement is carried out 8.2 describe the correct **procedures** for replacing and constructing different types of **joints** 8.3 describe how to check that **concrete** conforms to **specifications** and quality requirements 8.4 identify **equipment** required to compact **concrete** safely and achieve maximum density 8.5 state the strength of **concrete** required prior to opening to traffic 8.6 describe how to confirm the workability and strength of **concrete** 8.7 describe the texture and skid resistance required for the finished surface 8.8 explain how to apply the range of approved curing membranes.

Learning Outcome 9: Dispose of surplus materials
Assessment criteria: 9.1 identify **materials** that are unsuitable for re-use or surplus to requirements 9.2 store surplus **materials** and those unsuitable for reuse in safe temporary storage 9.3 ensure **materials** for disposal are loaded safely for transportation.

Learning Outcome 10: Understand how to dispose of surplus materials
Assessment criteria: 10.1 explain how to identify **materials** that are unsuitable for re-use or surplus to requirements 10.2 explain the importance of storing unsuitable and re-usable **materials** separately 10.3 describe how to load **materials** safely for transportation 10.4 explain when surplus **materials** should be removed from site.

Learning Outcome 11: Follow safe working practices
Assessment criteria: 11.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out. 11.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 11.3 leave the site in a clean and safe condition 11.4 describe how to leave the site in a clean and safe condition.

228: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Equipment** includes: (a) hand tools – including as necessary square mouth shovel, hand pick, rake, hand rammer, reinforcing bar cutters, wire cutting tools, trowel, hand tamping beam, hard bristle broom. (b) powered equipment – including as necessary vibrotamper, powered concrete cutting equipment, powered concrete drill, powered saw, a proprietary vibrator. 2. **Sub-base material** includes: (a) granular sub-base Type 1 material (b) pavement quality concrete (as described in specifications and SHW 1000) (c) alternative reinstatement materials (ARMs). 3. Safe **working practices** may include: (a) safe use of tools and equipment (b) use of appropriate PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 4. **Specifications** and **procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) Specification for Highways Works Series 1000 (c) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (d) Health and Safety Guidance 150, *Health and Safety in Construction* (e) manufacturers' operating procedures for powered tools and plant. 5. **Support** must be provided using (a) steel dowel bars of 20mm or 25mm nominal diameter. 6. The **mesh reinforcement** includes standard weights of mesh reinforcement. 7. **Joints** include: (a) contraction joints (b) expansion joints (c) warping joints. 8. The **concrete** includes: (a) Class 40 concrete (b) air entrainment additive. 9. **Materials** for disposal include: (a) unsuitable surplus materials (b) surplus materials that are suitable for re-use.

10. **Types of carriageway** includes Types 0, 1, 2, 3 and 4 concrete and bituminous overlaid concrete roads.

228: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 229 Reinstatement of modular surfaces and concrete footways

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to carry out the reinstatement of modular surfaces and concrete footways. The candidate will be able to remove existing modular or concrete surfacing, to prepare the sub-base, to lay bedding materials and modular or concrete surfacing, using the correct equipment. They will also be able to identify and dispose correctly and safely of surplus materials, and materials that cannot be re-used.

Learning Outcome 1: Remove existing modular and concrete surfacing
Assessment criteria: 1.1 select **equipment** and ensure that it is (a) suitable for the prescribed operation (b) in working condition and safe to use 1.2 take up the existing **modules** and **concrete** surfacing without causing unnecessary damage 1.3 remove any adhesive residues and brush **modules** clean 1.4 identify any damaged **modules** and set them aside for disposal or for use in an interim reinstatement 1.5 set aside broken **concrete** for disposal 1.6 identify **modules** that are suitable for re-use in permanent reinstatement, and stack them safely on site.

Learning Outcome 2: Understand how to remove existing modular and concrete surfacing
Assessment criteria: 2.1 explain the factors that influence the selection of **equipment** for the prescribed operation 2.2 explain how to check that **equipment** is in working condition and safe to use 2.3 explain how to avoid unnecessary damage when taking up existing **modules** 2.4 describe the **procedures** for taking up **concrete** surfacing 2.5 explain why adhesive residues are removed and **modules** brushed clean 2.6 describe the difference between suitable and unsuitable **modules** for interim and permanent reinstatement 2.7 describe storage methods for (a) damaged **modules** that cannot be reused (b) **modules** suitable for interim reinstatement (c) **modules** suitable for permanent reinstatement (d) broken **concrete**.

Learning Outcome 3: Prepare sub-base
Assessment criteria: 3.1 remove loose and unacceptable **materials** from the area to be reinstated using suitable **equipment** 3.2 identify any defects in the sub-base 3.3 make good any defects in the sub-base using specified materials 3.4 select sub-base compaction **equipment** and ensure that it is (a) suitable for the operation (b) in working condition and safe to use 3.5 compact the sub-base according to the **specification** 3.6 use suitable **equipment** to re-position displaced ironwork, kerbs and edge restraints in accordance with established levels.

Learning Outcome 4: Understand how to prepare the sub-base
Assessment criteria: 4.1 explain why loose and unacceptable **materials** are removed from the area to be reinstated 4.2 describe how to remove loose and unacceptable **materials** from the area to be reinstated 4.3 identify different sub-base defects that could be encountered 4.4 identify approved **sub-base materials** for replacing defective **materials** 4.5 explain the factors that influence the selection of sub-base compaction **equipment** for the prescribed operation 4.6 explain how to check that sub-base compaction **equipment** is in working condition and safe to use 4.7 explain the implications of poor reinstatement of **sub-base materials** 4.8 describe how to re-position displaced ironwork, kerbs and edge restraints.

Learning Outcome 5: Lay bedding materials
Assessment criteria: 5.1 select **equipment** and ensure that it is (a) suitable for the prescribed operation (b) in working condition and safe to use 5.2 select and lay the specified **bedding material** uniformly 5.3 compact the **bedding material** as necessary.

Learning Outcome 6: Understand how to lay bedding materials
Assessment criteria: 6.1 describe the materials that are used for bedding modular surfaces 6.2 explain the factors that influence the selection of **equipment** for the prescribed operation 6.3 explain how to check that **equipment** is in working condition and safe to use 6.4 explain the importance of laying **bedding material** evenly and to a specified depth 6.5 state the specified tolerances for laying **bedding material** 6.6 describe the implications of poor compaction of **bedding materials**.

Learning Outcome 7: Lay modular or concrete surfacing
Assessment criteria: 7.1 select **equipment** and ensure that it is (a) suitable for the prescribed operation (b) in working condition and safe to use 7.2 select **modules** and **concrete** for the reinstatement operation 7.3 position the **modules** to match the existing bond or pattern 7.4 cut **modules** for reinstatement to the required size 7.5 bed **modules** using suitable **bedding material** 7.6 compact **modules** to the existing line and level 7.7 apply and finish jointing material according to the **specification** 7.8 lay and compact paving **concrete** according to the **specification** 7.9 place a membrane and lay quality checked **concrete** surfacing 7.10 texture the finished surface and cure the **concrete**.

Learning Outcome 8: Understand how to lay modular or concrete surfacing
Assessment criteria: 8.1 explain the factors that influence the selection of **equipment** for the prescribed operation 8.2 explain how to check that **equipment** is in working condition and safe to use 8.3 describe **concrete** that is suitable for reinstatement 8.4 describe the different bond patterns used in modular construction 8.5 describe methods used for cutting **modules** 8.6 describe **procedures** for bedding and compacting **modules** to the existing line and level 8.7 describe **procedures** for applying and finishing jointing material 8.8 describe the consequences of inadequate compaction 8.9 explain the purpose of slip membranes used in rigid footway reinstatement 8.10 describe how to check that **concrete** is acceptable for use 8.11 describe **procedures** for laying the **concrete** surfacing 8.12 describe different types of textured finishes to **concrete** surfaces 8.13 describe **procedures** for curing the **concrete**.

Learning Outcome 9: Dispose of surplus materials
Assessment criteria: 9.1 identify **materials** that are unsuitable for re-use or surplus to requirements 9.2 store surplus **materials** and those unsuitable for reuse in safe temporary storage 9.3 ensure **materials** for disposal are loaded safely for transportation.

Learning Outcome 10: Understand how to dispose of surplus materials
Assessment criteria: 10.1 explain how to identify **materials** that are unsuitable for re-use or surplus to requirements 10.2 explain the importance of storing unsuitable and re-usable **materials** separately 10.3 describe how to load **materials** safely for transportation 10.4 explain when surplus **materials** should be removed from site.

Learning Outcome 11: Follow safe working practices for locating and avoiding underground apparatus and highways services
Assessment criteria: 11.1 follow current relevant health and safety regulations, standards and other legislation relating to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 11.2 identify the current relevant health and safety regulations, standards and other legislation that must be applied in relation to: (a) **working practices** within the construction environment (b) **working practices** specific to any practical task that they are required to carry out 11.3 leave the site in a clean and safe condition 11.4 describe how to leave the site in a clean and safe condition.

E229: vidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Modules** <u>must</u> include: (a) natural or pre-cast concrete paving slabs (b) pre-cast concrete blocks or similar units. 2. **Concrete** is Class 30 concrete for footway concrete paving reinstatement 3. **Equipment** includes: (a) hand tools – including square and round mouth shovels, lifting and clearing tools (including hand pick, crowbar, bolster, club hammer, wire brush, hard bristle broom, rake), hand rammer, straight edge (or suitably cut) timber, trowel, a textured roller. (b) powered equipment – including concrete cutting equipment, concrete saw, vibrotamper, vibrating plate. 4. **Sub-base materials** include granular Type 1 sub-base or Class A material. 5. **Bedding material** includes: (a) cement mortar or lime mortar (b) sharp sand. 6. Safe **working practices** include: (a) safe use of tools and equipment (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 7. **Specifications** and **procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) BS 7533 Series (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant (e) Application Guide 26. 8. **Materials** for disposal include: (a) unsuitable surplus materials (b) surplus materials that are suitable for re-use.

229: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 230 Monitoring signing, lighting and guarding

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to successfully monitor the signing, lighting and guarding of a work site. The candidate will be able to monitor a work site survey to ensure that suitable provision is in place for the site location requirements and those with special needs, including cyclists and horse riders, and to monitor the protection of pedestrians, site personnel and vehicular traffic on site. They will also be able to monitor the provision and control of portable traffic signals in line with site location requirements and traffic conditions, and they will be able to monitor site safety throughout the signing, lighting and guarding operation.

Candidates undertaking this unit must use the current version of *Safety at Street Works and Road* Works: A Code of Practice.

Learning Outcome 1: Monitor a work site survey
Assessment criteria: 1.1 ensure that the planned provision of footways, traffic lanes and safety zones from a given planned site meets the requirements of: (a) **the site location** (b) people with **special needs** 1.2 ensure that the planned provision of footways, traffic lanes and safety zones minimises disruption to traffic and provides for the safe passage of pedestrians 1.3 ensure that the planned provision for vehicles and plant within the confines of the working area gives adequate coverage and safety for people and vehicles in the vicinity 1.4 check for problems with the planned provision arising from the site survey and confirm the appropriate action required 1.5 carry out an on-site risk assessment in respect of signing, lighting and guarding to ensure that provision is made to control any identified hazards.

Learning Outcome 2: Understand how to monitor a work site survey
Assessment criteria: 2.1 describe the requirements of the Code of Practice in respect of surveying the work site 2.2 describe the health and safety requirements relating to surveying the work site 2.3 explain how to plan provision of footways, traffic lanes and safety zones to meet the requirements of: (a) the **site location** (b) people with **special needs** 2.4 explain how to minimise disruption to traffic and ensure the safe passage of pedestrians when planning provision of footways, traffic lanes and safety zones 2.5 explain how to plan provision for vehicles and plant within the confines of the working area to ensure: (a) traffic lanes (b) safe passage through the site (c) advance signing (d) type of traffic (e) volume of traffic 2.6 describe the problems that can occur with planned provision arising from a work site survey, and the appropriate remedial action to resolve them 2.7 explain the site conditions for the use of Priority signing and Give and Take systems of working.

Learning Outcome 3: Monitor the protection of pedestrians, vehicular traffic and site personnel
Assessment criteria: 3.1 ensure that personal protective equipment is selected to meet the job requirements 3.2 assess the provision of footways, traffic lanes and safety zones for: (a) the requirements of the **site location** (b) the safe passage of pedestrians (c) minimising disruption to and ensuring safety of vehicular traffic (d) any identified **special needs** 3.3 confirm that the provision for controlling the movement of pedestrians, vehicles and plant within the confines of the working area: (a) minimises delay and inconvenience (b) makes adequate safety provisions 3.4 ensure that **equipment** selected meets the **site location** requirements and any **special needs** 3.5 ensure that pre-use inspection checks of **equipment** are completed 3.6 monitor the positioning and removal of **equipment** according to the specified sequence 3.7 check for problems with the protection of pedestrians, vehicular traffic and site personnel, and confirm the appropriate action required.

Learning Outcome 4: Understand how to monitor the protection of pedestrians, vehicular traffic and site personnel
Assessment criteria: 4.1 describe the personal protective **equipment** to meet the job requirements 4.2 describe the factors governing the provision of footways, traffic lanes and safety zones and when it is necessary to liaise with the highway authority 4.3 explain how the **equipment** meets the requirements of the **site location** and any **special needs** 4.4 describe pre-use **equipment** checks 4.5 identify the specified sequences for positioning and removing **equipment** 4.6 describe potential problems with the protection of pedestrians, vehicular traffic and site personnel, and the appropriate remedial action.

Learning Outcome 5: Monitor the provision of portable traffic signals and Stop/Go traffic control
Assessment criteria: 5.1 monitor the inspection and testing of **signals** for correct operation 5.2 ensure that **signals** are positioned in the correct sequence, and to meet the requirements of the **site location** 5.3 monitor the adjustment of signal controls to suit the prevailing traffic conditions 5.4 ensure that **signals** are dismantled and removed in line with current relevant specifications and procedures 5.5 ensure that Stop/Go traffic control is installed in a specified sequence 5.6 check for any problems with the provision of portable traffic **signals** and Stop/Go traffic control and confirm the appropriate action required.

Learning Outcome 6: Understand how to monitor the provision of portable traffic signals and Stop/Go traffic control
Assessment criteria: 6.1 describe the procedures for inspecting and testing **signals** for correct operation 6.2 explain how the site location requirements affect the positioning of **signals**, and the circumstances under which the highway authority must be consulted 6.3 describe the correct sequence for positioning **signals** 6.4 explain how the prevailing traffic conditions affect the adjustment of signal controls 6.5 describe the requirements for dismantling and removal of portable traffic **signals** 6.6 describe the requirements for installation and removal of Stop/Go traffic control 6.7 describe potential problems with the provision of portable traffic **signals** and Stop/Go traffic control and the appropriate remedial action.

Learning Outcome 7: Monitor site safety
Assessment criteria: 7.1 ensure that an risk assessment has been carried out 7.2 monitor site operations in accordance with health and safety requirements 7.3 assess site conditions in accordance with health and safety requirements 7.4 ensure that safety **equipment** is available and fit for purpose 7.5 ensure that **safe working practices** are followed in line with current relevant specifications 7.6 check for risks to site safety, and confirm the appropriate action required.

Learning Outcome 8: Understand how to monitor site safety
Assessment criteria: 8.1 explain the purpose of an on-site risk assessment 8.2 describe the health and safety requirements for site operations 8.3 describe the health and safety requirements for different site conditions 8.4 describe the safety **equipment** required during site operations and how to ensure that it is fit for purpose 8.5 describe **safe working practices** on site 8.6 describe the potential risks to site safety and the appropriate remedial action.

230: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Site location** requirements include: (a) proximity to schools and hospitals (b) users of the route (including those with special needs) (c) weather conditions (including icy roads, heavy rain, snow, fog, etc.) (d) volume of traffic (e) speed of traffic (f) lighting on highways (g) highway situations (including lack of footways; pedestrianized areas; emergency service access; width of traffic lanes, footways and safety zones; inadequate lane widths; serious congestion; private access; bus stops, parking places, etc.; obstruction of driver's view at bends and summits; roundabouts and junctions; footways, ramps, boards and road plates; railway level crossings; tramways; cycle lanes and cycle tracks) (h) different requirements for working at day and night (i) mobile works and minor works (j) the safety zone (length of lead-in taper of cones (T); sideways clearance (S); longways clearance (L); length of exit taper of cones). 2. Those with s**pecial needs** include: (a) visually impaired people (b) people with disabilities (c) users of prams and pushchairs (d) users of wheelchairs and other physically impaired people (e) cyclists (f) young children (g) horse riders. 3. **Safe working practices** include: (a) safe use of tools and **equipment** (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, gloves, protective footwear, waterproof clothing) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to **equipment** or apparatus. 4. **Equipment** may include as necessary: (a) adequate range of signing, lighting and guarding **equipment** (including signs, cones, **signals**, lamps, footway boards, barriers, portable traffic **signals**) (b) high visibility safety **equipment** (c) suitable materials to construct ramps. 5. **Signals** include: (a) proprietary electrical or engine powered portable traffic lights (b) set of Stop/Go boards.

230: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. For safety reasons, observed assessments of candidates monitoring signing, lighting and guarding activities must take place at a centre, or a location linked to a centre, that has been approved by the centre's external verifier prior to use for assessment. The site used for assessment must be a real road with unpredictable traffic flows. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 231 Monitoring excavation in the highway

Unit Aim

This unit is designed to allow the candidate to demonstrate the skills and knowledge required to monitor excavation in the highway. The candidate will be able to monitor excavation work, in line with the relevant specifications and codes of practice, and will show that they monitor the action taken to avoid damage to underground apparatus during excavation. The candidate will also be able to monitor the selection, storage and disposal of re-usable and unusable materials on site, and they will be able to monitor site safety throughout the excavation operation.

Learning Outcome 1: Monitor excavation work in the highway
Assessment criteria: 1.1 ensure that the footway or carriageway structure has been identified correctly prior to excavation 1.2 ensure that materials are excavated at all construction layers according to current **specifications** 1.3 ensure that the working methods used minimise the risk of reinstatement failure 1.4 ensure that the size of the excavation is sufficient for the work activity and future reinstatement 1.5 check for any problems with the excavation work, and confirm the appropriate action required.

Learning Outcome 2: Understand how to monitor excavation work in the highway
Assessment criteria: 2.1 describe the characteristics of the main types of footway and carriageway 2.2 describe the factors that affect the selection of **equipment** required for excavation activities 2.3 describe how to check that **equipment** is fit for purpose 2.4 explain how to identify areas of high risk for excavation activities 2.5 describe the precautions to take when excavating in **high risk areas** 2.6 explain why trenches must be excavated to the correct **specifications** 2.7 describe working methods that minimise the need for subsequent reinstatement 2.8 describe potential problems with excavation work and the appropriate remedial action.

Learning Outcome 3: Monitor the action taken to avoid damage to underground apparatus during excavation
Assessment criteria: 3.1 ensure that **utilities apparatus** is located and marked correctly on site 3.2 ensure that exposed **utilities apparatus** is identified correctly 3.3 ensure that precautions are taken to minimise the risk of damage to **utilities apparatus** 3.4 identify damage to **utilities apparatus** and confirm the action required 3.5 ensure that exposed **utilities apparatus** is supported and protected safely.

Learning Outcome 4: Understand how to monitor the action taken to avoid damage to underground apparatus during excavation
Assessment criteria: 4.1 explain how to locate and mark the different types of **utilities apparatus** found on site 4.2 explain how to identify the different types of exposed **utilities apparatus** 4.3 describe the risks and consequences of damage to **utilities apparatus** 4.4 explain the precautions required to avoid damage to **utilities apparatus** 4.5 explain how to safely support and protect exposed **utilities apparatus** 4.6 describe the circumstances in which trench sidewall support is needed, and where to find the guidelines for its provision.

Learning Outcome 5: Monitor the selection, disposal and storage of excavated materials
Assessment criteria: 5.1 ensure that **excavated materials** selected for re-use are checked against the current **specification** 5.2 ensure that materials selected for disposal are confirmed as unsuitable for re-use 5.3 ensure that re-usable materials are stored in line with current relevant **specifications and procedures** 5.4 ensure that materials that cannot be re-used are stored and disposed of in line with current relevant **specifications and procedures** 5.5 check for any problems with the selection, storage and disposal of materials and confirm the appropriate action required.

Learning Outcome 6: Understand how to monitor the selection, disposal and storage of excavated materials
Assessment criteria: 6.1 describe the range of backfill, sub-base materials that may be re-used 6.2 describe the factors influencing the selection of materials for re-use or for disposal and the consequences of using unsuitable materials 6.3 describe suitable and safe storage **procedures** for re-usable materials 6.4 describe the correct **procedures** for storage and re-use of chalk 6.5 describe suitable and safe storage and disposal **procedures** for materials that cannot be re-used 6.6 describe potential problems with selection, storage and disposal of materials and the appropriate remedial action.

Learning Outcome 7: Monitor site safety
Assessment criteria: 7.1 ensure that an risk assessment has been carried out 7.2 monitor site operations in accordance with health and safety requirements 7.3 assess site conditions in accordance with health and safety requirements 7.4 ensure that **safety equipment** is available and fit for purpose 7.5 ensure that **safe working practices** are followed in line with current relevant **specification** 7.6 check for risks to site safety, and confirm the appropriate action required.

Learning Outcome 8: Understand how to monitor site safety
Assessment criteria: 8.1 explain the purpose of an on-site risk assessment 8.2 describe the health and safety requirements for site operations 8.3 describe the health and safety requirements for different site conditions 8.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose 8.5 describe **safe working practices** on site 8.6 describe the potential risks to site safety and the appropriate remedial action.

231: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Specifications and procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant. 2. Factors influencing the size and depth of excavation and support equipment include: (a) trench width, length and depth (b) ease of access (c) types of ground 3. Suitable **equipment** includes as necessary: (a) hand tools (b) powered equipment – pavement saw, breaking-out tools (c) equipment to support exposed utilities – slings, ropes, props. (d) equipment to minimise noise nuisance 4. **Safe working practices** include: (a) safe use of tools and equipment (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 5. **Utilities apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains (c) sewers and drains (d) high- and low-voltage electricity cables (e) telecommunications, television cables and optic fibres 6. **Excavated materials** include: (a) Class A (b) Class B (c) Class C (d) Class D (e) Class E. 7. **Safety equipment** may include as necessary: (a) adequate range of signing, lighting and guarding equipment (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals) (b) high visibility safety equipment (c) suitable materials to construct ramps.

8. **High risk areas** include:
   (a) Utilities apparatus
   (b) in close proximity to trees
   (c) bad ground conditions
   (d) special engineering difficulty.

231: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 232 Monitoring reinstatement and compaction of backfill materials

Unit Aim

This unit is designed to allow the learner to demonstrate the skills and knowledge required to monitor the reinstatement and compaction of backfill materials. The learner will be able to monitor the selection and storage of backfill materials, monitor the selection of compaction plant for backfilling operations, monitor the construction of the backfill layer, and monitor the action taken to avoid damage to underground apparatus during backfilling. The learner will also be able to monitor site safety throughout backfill operations.

Learning Outcome 1: Monitor the selection and storage of backfill materials in footway and carriageway reinstatement
Assessment criteria: 1.1 ensure that **materials** selected for re-use and imported **materials** are checked against the range of backfill **materials** permitted in the current specification 1.2 ensure that the correct backfill **materials** are selected for use as surround to utilities' apparatus and in sensitive areas 1.3 ensure that the correct quantities of **materials** are calculated for use 1.4 ensure that safe arrangements are made for the storage of re-usable and imported **materials** in accordance with current **specifications and procedures** 1.5 ensure that safe temporary storage arrangements are made for **materials** not suitable for re-use in accordance with current **specifications and procedures** 1.6 ensure that the quantities of **materials** selected for re-use meet the reinstatement requirements 1.7 check for problems with the selection and storage of backfill **materials** and confirm the appropriate action required.

Learning Outcome 2: Understand how to monitor the selection and storage of backfill materials in footway and carriageway reinstatement
Assessment criteria: 2.1 describe the range of backfill **materials** permitted in the current specification 2.2 explain the factors that influence the selection of **materials** for use as backfill or for disposal 2.3 describe the consequences of using unsuitable **materials** for backfill 2.4 describe the **materials** that are suitable for use in **high risk areas** 2.5 describe safe storage arrangements for: (a) re-usable **materials** (b) imported **materials** (c) **materials** unsuitable for re-use 2.6 explain how the characteristics of **materials** affect storage arrangements 2.7 describe potential problems with selection and storage of backfill **materials**, and the appropriate remedial action.

Learning Outcome 3: Monitor the selection of plant for compaction of backfill material
Assessment criteria: 3.1 ensure that the **compaction plant** is: (a) suitable to the location and **materials** (b) suitable to the dimensions and access provisions of the site (c) in working condition and safe to use 3.2 check for any problems with the selection of **compaction plant** and confirm the appropriate action required.

Learning Outcome 4: Understand how to monitor the selection of plant for compaction of backfill material
Assessment criteria: 4.1 explain the factors that influence the selection of **compaction plant** 4.2 describe how to check that the **compaction plant** is fit for purpose 4.3 describe potential problems with the selection of **compaction plant**, and the appropriate remedial action.

Learning Outcome 5: Monitor the construction of the backfill layer
Assessment criteria: 5.1 ensure that the backfill layer is constructed in accordance with the (a) specification (b) existing pavement structure (c) road type 5.2 ensure that the backfill layer is checked using suitable **equipment** and **materials** for the job 5.3 check that the backfill layer is constructed correctly to (a) the compaction level (b) the layer thickness (c) the degree of compaction (d) **high risk areas** 5.4 check for any problems with the construction of the backfill layer and confirm the appropriate action required.

Learning Outcome 6: Understand how to monitor the construction of the backfill layer
Assessment criteria: 6.1 describe how to interpret the specification for constructing the backfill layer in footway and carriageway reinstatement 6.2 describe how to check the construction of the backfill layer to ensure: (a) the correct use of **equipment** and **materials** (b) the achieved compaction level (c) the correct layer thickness and degree of compaction (d) correct construction in **high risk areas** 6.3 describe the methods used to confirm that construction of the backfill layer meets **specifications** 6.4 describe potential problems with the construction of the backfill layer, and the appropriate remedial action.

Learning Outcome 7: Monitor the action taken to avoid damage to underground apparatus during backfill operations
Assessment criteria: 7.1 ensure that exposed **utilities apparatus** is identified correctly 7.2 ensure the exposed utilities apparatus is **safely supported and protected** 7.3 ensure that precautions are taken to minimise the risk of damage to **utilities apparatus** 7.4 identify damage to underground **utilities apparatus** and confirm the action required.

Learning Outcome 8: Understand how to monitor the action taken to avoid damage to underground apparatus during backfill operations
Assessment criteria: 8.1 explain how to identify the different types of **utilities apparatus** on site 8.2 describe different methods of **safely supporting and protecting** exposed **utilities apparatus** 8.3 explain the potential risks and consequences of damage to **utilities apparatus** 8.4 explain the precautions required to avoid damage to **utilities apparatus** 8.5 describe the potential problems arising from damage to utilities' apparatus, and the appropriate remedial action.

Learning Outcome 9: Monitor site safety
Assessment criteria: 9.1 ensure that a risk assessment has been carried out 9.2 monitor site operations in accordance with health and safety requirements 9.3 assess site conditions in accordance with health and safety requirements 9.4 ensure that **safety equipment** is available and fit for purpose 9.5 ensure that **safe working practices** are followed in line with current relevant **specifications** 9.6 check for risks to site safety, and confirm the appropriate action required 9.7 ensure that the site is left in a clean and safe condition.

Learning Outcome 10: Understand how to monitor site safety
Assessment criteria: 10.1 explain the purpose of an on-site risk assessment 10.2 describe the health and safety requirements for site operations 10.3 describe the health and safety requirements for different site conditions 10.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose 10.5 describe **safe working practices** on site 10.6 describe the potential risks to site safety and the appropriate remedial action 10.7 describe how to leave the site in a clean and safe condition.

232: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Materials** include: (a) Class A (b) Class B (c) Class C (d) Class D (e) Class E. 2. **Specifications and procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) Health and Safety Guidance 47, *Avoiding Danger from Underground Services* (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant (e) *Safety and Street Works and Road Works – A Code of Practice*. 3. **Safe working practices** may include: (a) safe use of tools and **equipment** (b) use of appropriate PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to **equipment** or apparatus. 4. **Compaction plant**/powered **equipment** includes: (a) vibrotamper (b) vibrating plate (c) vibrating roller (d) percussive rammer. 5. Measuring **equipment** may include as necessary: (a) measuring devices, rule and tape. 6. **Utilities apparatus** includes: (a) plastic and metallic gas mains (b) plastic and metallic water mains (c) sewers and drains (d) high- and low-voltage electricity cables (e) telecommunications and television cables. 7. Utilities apparatus is **safely supported and protected** using: (a) slings (b) ropes (c) props. 8. **Safety equipment** may include as necessary:

(a) adequate range of signing, lighting and guarding **equipment** (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals)
(b) high visibility safety **equipment**
(c) suitable materials to construct ramps.

9. **High risk areas** includes:
(a) as a surround to utilities' apparatus
(b) in close proximity to trees
(c) bad ground conditions
(d) special engineering difficulty.

232: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 233 Monitoring reinstatement of sub-base and roadbase in non-bituminous materials

Unit Aim

This unit is designed to allow the learner to demonstrate the skills and knowledge required to monitor the reinstatement of sub-base and roadbase in non-bituminous materials. The learner will be able to monitor the selection of non-bituminous materials, monitor the selection of compaction plant for the reinstatement of sub-base and roadbase and monitor the construction of the sub-base and roadbase. The learner will also be able to monitor site safety throughout sub-base and roadbase reinstatement.

Learning Outcome 1: Monitor the selection of non-bituminous materials for sub-base and base (roadbase) reinstatement
Assessment criteria: 1.1 ensure that excavated **materials** for reuse or disposal are identified and checked against the current **specification** 1.2 ensure that imported **materials** selected for use are identified and checked against the current **specification** 1.3 ensure that the quantities of **materials** selected for use meet reinstatement requirements 1.4 ensure that re-usable and imported **materials** are stored in accordance with current **specifications and procedures** 1.5 ensure that safe temporary storage arrangements are made for **materials** not suitable for re-use in accordance with current **specifications and procedures** 1.6 check for any problems that arise with the selection and storage of sub-base and roadbase **materials** and confirm the appropriate action required.

Learning Outcome 2: Understand how to monitor the selection of non-bituminous materials for sub-base and roadbase reinstatement
Assessment criteria: 2.1 describe the range of sub-base and roadbase **materials** permitted in the current **specification** 2.2 explain factors influencing the selection of **materials** for use in sub-base and roadbase and the consequences of using unsuitable **materials** 2.3 calculate quantities of different **materials** that are used in sub-base and roadbase reinstatement 2.4 describe safe storage arrangements for: (a) re-usable **materials** (b) imported **materials** (c) **materials** unsuitable for re-use 2.5 describe potential problems with selection and storage of sub-base and roadbase **materials**, and the appropriate remedial action.

Learning Outcome 3: Monitor the selection of plant for compaction of sub-base and roadbase material
Assessment criteria: 3.1 ensure that the **compaction plant** is (a) suitable to the location and **materials** (b) suitable to dimensions and access provisions of the site (c) in working condition and safe to use 3.2 check for any problems with the selection of **plant** for the compaction of sub-base and roadbase material, and confirm the appropriate action.

Learning Outcome 4: Understand how to monitor the selection of plant for compaction of sub-base and roadbase material
Assessment criteria: 4.1 explain the factors that influence the selection of **compaction plant** 4.2 describe how to check that the **compaction plant** is in working condition and safe to use 4.3 describe potential problems with the selection of **compaction plant** for sub-base and roadbase reinstatement, and the appropriate remedial action.

Learning Outcome 5: Monitor the construction of sub-base and roadbase materials
Assessment criteria: 5.1 ensure that the backfill or surround has been adequately prepared to receive subsequent layers 5.2 ensure that the non-bituminous layer is constructed in accordance with (a) the **specification** (b) the existing pavement structure and road type 5.3 using the correct **measuring equipment** check that the layers are constructed (a) using suitable **powered equipment** and **materials** (b) to the correct compaction level (c) to the correct layer thickness and degree of compaction (d) correctly in **high risk areas** 5.4 check for any problems with the construction of the sub base and roadbase, and confirm the appropriate action.

Learning Outcome 6: Understand how to monitor the construction of sub-base and roadbase materials
Assessment criteria: 6.1 explain how to identify when the backfill or surround is adequately prepared to receive subsequent layers 6.2 describe how to interpret the **specification** for constructing the non-bituminous layer in different **pavement structures and road types**. 6.3 describe how to check construction of the layers to ensure the (a) correct use of equipment and **materials** (b) achieved compaction level (c) correct layer thickness and degree of compaction (d) correct construction in **high risk areas** 6.4 state the **measuring equipment** for checking the construction of the sub-base and roadbase 6.5 describe potential problems with the construction of the sub-base and roadbase, and the appropriate remedial action

Learning Outcome 7: Monitor site safety
Assessment criteria: 7.1 ensure that a risk assessment has been carried out 7.2 monitor site operations in accordance with health and safety requirements 7.3 assess site conditions in accordance with health and safety requirements 7.4 ensure that **safety equipment** is available and fit for purpose 7.5 ensure that **safe working practices** are followed in line with health and safety requirements and current relevant **specifications** 7.6 check for risks to site safety, and confirm the appropriate action required 7.7 ensure that the site is left in a clean and safe condition.

Learning Outcome 8: Understand how to monitor site safety
Assessment criteria: 8.1 explain the purpose of an on-site risk assessment 8.2 describe the health and safety requirements for site operations 8.3 describe the health and safety requirements for different site conditions 8.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose. 8.5 describe **safe working practices** on site 8.6 describe the potential risks to site safety and the appropriate remedial action 8.7 describe how to leave the site in a clean and safe condition.

233: Evidence Requirements / Scope

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Materials** include:
   (a) Granular Type 1 sub-base material
   (b) excavated granular sub-base material Class A
   (c) category 3 cement-bound material (CBM3)
   (d) foamed concrete

2. **Specifications and procedures** include:
   (a) Specification for the Reinstatement of Openings in Highways
   (b) Health and Safety Guidance 150, Health and Safety in construction
   (c) Safety at Street Works and Road Works – A Code of Practice.

3. **Safe working practices** include:
   (a) safe use of tools and equipment
   (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask)
   (c) use of risk assessment methods to identify and control hazards on site
   (d) precautions to minimise danger or inconvenience to road users
   (e) precautions to minimise danger or inconvenience to site personnel
   (f) precautions to minimise damage to equipment or apparatus.

4. **Compaction plant/powered equipment** includes:
   (a) vibrotamper
   (b) vibrating plate
   (c) vibrating roller
   (d) percussive rammer
   (e) hand rammer.

5. **Measuring equipment** may include as necessary:
   (a) measuring devices, rule and tape.

6. **Safety equipment** may include as necessary:
   (a) adequate range of signing, lighting and guarding equipment (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals)
   (b) high visibility safety equipment
   (c) suitable **materials** to construct ramps.

7. **High risk areas** includes:
   (a) as a surround to utilities' apparatus
   (b) in close proximity to trees
   (c) bad ground conditions
   (d) special engineering difficulty.

8. **Pavement structures and road types** (AC 6.2)
   (a) Type 0, 1, 2, 3, and 4 Flexible road construction

233: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 234 Monitoring reinstatement in bituminous materials

Unit Aim

This unit is designed to allow the learner to demonstrate the skills and knowledge required to monitor the reinstatement of flexible base (roadbase) and surface layers in bituminous materials. The learner will be able to monitor the selection of bituminous materials (hot and cold-lay), monitor the selection of compaction plant for the reinstatement of bituminous materials and monitor the construction of the flexible base (roadbase) and surface layers. The learner will also be able to monitor site safety throughout sub-base and base (roadbase) reinstatement.

Learning Outcome 1: Monitor the selection of bituminous materials for flexible footway and carriageway reinstatement
Assessment criteria: 1.1 ensure that the bituminous **materials** are identified and checked against the current **specification** 1.2 ensure that the quantities of **materials** selected for use meet reinstatement requirements 1.3 ensure that bituminous **materials** are stored in line with current **specifications and procedures** 1.4 check for any problems with the selection and storage of bituminous **materials**, and confirm the appropriate action.

Learning Outcome 2: Understand how to monitor the selection of bituminous materials for flexible footway and carriageway reinstatement
Assessment criteria: 2.1 describe the range of bituminous **materials** permitted in the current **specification** 2.2 explain the **factors** influencing the selection of bituminous **materials** and the consequences of using unsuitable **materials** 2.3 calculate quantities of different bituminous **materials** used in flexible footway and carriageway reinstatement 2.4 describe suitable and safe storage **procedures** for bituminous **materials** 2.5 describe potential problems with selection and storage of bituminous **materials**, and the appropriate remedial action.

Learning Outcome 3: Monitor the selection of plant for compaction of bituminous materials
Assessment criteria: 3.1 ensure that the **compaction plant** is: (a) suitable to the location and **materials** (b) suitable to dimensions and access provisions of the site (c) in working condition and safe to use 3.2 check for any problems with the selection of plant for the compaction of bituminous material, and confirm the appropriate action.

Learning Outcome 4: Understand how to monitor the selection of plant for the compaction of bituminous materials

Assessment criteria:

4.1 explain the **factors** that influence the selection of **compaction plant**

4.2 describe how to check that the **compaction plant** is in working condition and safe to use

4.3 describe potential problems with the selection of **compaction plant** for reinstatement in bituminous **materials**, and the appropriate remedial action.

Learning Outcome 5: Monitor the construction of flexible base (roadbase) and surface layers in hot and cold-lay bituminous materials

Assessment criteria:

5.1 ensure that the base (roadbase) and flexible surface layers are constructed in accordance with

- (a) the **specification**
- (b) the existing pavement structure and road type

5.2 check using the correct measuring **equipment** that the layers are constructed

- (a) using suitable **powered equipment** and **materials**
- (b) to the correct compaction level
- (c) to the correct layer thickness and degree of compaction

5.3 check that the texture depth and finished level of the surface reinstatement are correct

5.4 ensure that the profile of the finished surface is within permitted tolerances

5.5 check for any problems with the construction of the base (roadbase) and flexible surface layers, and confirm the appropriate action.

Learning Outcome 6: Understand how to monitor the construction of flexible, base (roadbase) and surface layers in hot and cold-lay bituminous materials

Assessment criteria:

6.1 describe how to interpret the **specification** for constructing the bituminous flexible, base (roadbase) and surface layers in different pavement structures and road types

6.2 describe the intervention limits permitted in **specifications**

6.3 describe how to check construction of the layers to ensure the

- (a) correct use of **equipment** and **materials**
- (b) achieved compaction level
- (c) correct layer thickness, degree of compaction and permitted tolerances

6.4 describe how to check that the texture depth and finished level of the surface reinstatement are correct

6.5 describe how to check that the profile of the finished surface is within permitted tolerances

6.6 describe potential problems with the construction of the base (roadbase) and surface layers and the appropriate remedial action.

Learning Outcome 7: Monitor site safety
Assessment criteria: 7.1 ensure that a risk assessment has been carried out 7.2 monitor site operations in accordance with health and safety requirements. 7.3 assess site conditions in accordance with health and safety requirements. 7.4 ensure that **safety equipment** is available and fit for purpose 7.5 ensure that **safe working practices** are followed in line with health and safety requirements and current relevant **specifications** 7.6 check for risks to site safety, and confirm the appropriate action required 7.7 ensure that the site is left in a clean and safe condition.

Learning Outcome 8: Understand how to monitor site safety
Assessment criteria: 8.1 explain the purpose of an on-site risk assessment 8.2 describe the health and safety requirements for site operations 8.3 describe the health and safety requirements for particular site conditions 8.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose 8.5 describe **safe working practices** on site 8.6 describe the potential risks to site safety and the appropriate remedial action 8.7 describe how to leave the site in a clean and safe condition.

234: Evidence Requirements / Scope

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Materials** are materials identified for constructing base (roadbase) and for constructing an asphalt concrete surface course to BS EN 13108 and PD 6691 in accordance with specifications, to include:
   (a) deferred set mixtures for reinstatement
   (b) permanent cold-lay binder course materials
   (c) edge sealants
   (d) dense binder course materials (20mm nominal stone size), hot rolled asphalt 50/20 binder course
   (e) close graded surface course materials (10mm stone size), hot rolled asphalt 30/14 surface course
   (f) hot rolled asphalt binder and surface course
   (g) close graded surface course materials (10mm stone size)
   (h) asphalt concrete dense surface course
   (i) stone mastic asphalt surface and binder course
   (j) pre-coated 14mm or 20mm chippings
   (k) tack coat.

   (Note: In small excavations and narrow trenches, the preferred binder course mixture may be replaced by any surface course mixture given in the Specification, for the respective road Type, provided the same mixture is used as the surface course.)

2. **Factors** influencing the selection of materials and compaction plant include**:**
   (a) constituent mix for asphalt concrete
   (b) temperature limits for hot bituminous materials
   (c) polished stone values
   (d) aggregate abrasion values
   (e) penetration grade of binders
   (f) constituent mix for hot dense bituminous materials

3. **Specifications and procedures** include:
   (a) Specification for the Reinstatement of Openings in Highways
   (b) Health and Safety Guidance 150, *Health and Safety in Construction,*
   (c) manufacturers' operating procedures for powered tools and plant
   (d) *Safety and Street Works and Road Works – A Code of Practice*.

4. **Safe working practices** include:
   (a) safe use of tools and equipment
   (b) use of appropriate PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask)
   (c) use of risk assessment methods to identify and control hazards on site
   (d) precautions to minimise danger or inconvenience to road users
   (e) precautions to minimise danger or inconvenience to site personnel
   (f) precautions to minimise damage to equipment or apparatus
   (g) safe working practice for working with molten bitumen
   (h) personal hygiene measures in connection with skin contamination.

5. **Compaction plant/powered equipment** includes:

(a) vibrotamper
(b) vibrating plate
(c) vibrating roller
(d) percussive rammer.

6. **Equipment** may include as necessary:
   (a) measuring devices, rule and tape
   (b) forks
   (c) rakes
   (d) shovels
   (e) tool heater
   (f) hand tamper.

7. **Safety equipment** may include as necessary:
   (a) adequate range of signing, lighting and guarding equipment (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals)
   (b) high visibility safety equipment
   (c) suitable materials to construct ramps.

234: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 235 Monitoring reinstatement of concrete slabs

Unit Aim

This unit is designed to allow the learner to demonstrate the skills and knowledge required to monitor the reinstatement of concrete slabs. The learner will be able to monitor preparation and construction of concrete slab, and will be able to monitor site safety throughout concrete slab reinstatement.

Learning Outcome 1: Monitor the preparation for concrete slab reinstatement
Assessment criteria: 1.1 ensure that the materials selected for use are identified and checked against the current **specification** 1.2 ensure that the **equipment** selected for use is: (a) suitable to the site conditions and materials (b) suitable to the prescribed operation (c) in working condition and safe to use 1.3 ensure that sub-base defects are identified and made good using specified **sub-base materials** 1.4 ensure that slab edges are prepared according to the **specification** to form a support using steel **dowel bars** 1.5 ensure that the slip membrane is positioned according to the **specification** 1.6 ensure that slab edge support is provided 1.7 ensure that **mesh reinforcement** is fixed according to **specification** 1.8 check for any problems with the preparation for **concrete** slab reinstatement and confirm the appropriate action.

Learning Outcome 2: Understand how to monitor the preparation for concrete slab reinstatement
Assessment criteria: 2.1 identify the **type of carriageway** on which the reinstatement of **concrete** slabs is carried out 2.2 explain the **factors that influence the selection** of materials and **equipment** for reinstating **concrete** slabs 2.3 identify different potential sub-base defects 2.4 explain how to rectify different sub base defects 2.5 describe the **procedures** for positioning the slip membrane and preparing slab edges 2.6 describe the **procedures** for providing taper edge and **dowel bar** support 2.7 describe the **procedures** for laying and fixing **mesh reinforcement** 2.8 describe potential problems with the preparation for **concrete** slab reinstatement and the appropriate remedial action.

Learning Outcome 3: Monitor the reinstatement of concrete slabs
Assessment criteria: 3.1 monitor the construction of the **concrete** slab, checking: (a) replacement of missing or damaged **joints** (b) use of **concrete** (c) degree of compaction (d) air entrainment 3.2 ensure that the finish is laid to the permitted tolerances and textured to match the existing surface 3.3 check the use of a curing membrane 3.4 check for any problems with the reinstatement of **concrete** slabs, and confirm the appropriate action.

Learning Outcome 4: Understand how to monitor the reinstatement of concrete slabs
Assessment criteria: 4.1 describe methods of constructing the **concrete** slab 4.2 describe different **joints** used in constructing **concrete** slabs 4.3 explain the functions of **joints** in the construction of **concrete** slabs 4.4 explain **factors that affect the quality** of the finished **concrete** surface 4.5 describe **checks and tests** to confirm the quality of the **concrete** slab and finished surface 4.6 describe potential problems with the reinstatement of **concrete** slabs, and the appropriate remedial action.

Learning Outcome 5: Monitor site safety
Assessment criteria: 5.1 ensure that a risk assessment has been carried out 5.2 monitor site operations in accordance with health and safety requirements 5.3 assess site conditions in accordance with health and safety requirements 5.4 ensure that **safety equipment** is available and fit for purpose 5.5 ensure that **safe working practices** are followed in line with health and safety requirements and current relevant **specifications** 5.6 check for risks to site safety, and confirm the appropriate action required 5.7 ensure that the site is left in a clean and safe condition.

Learning Outcome 6: Understand how to monitor site safety
Assessment criteria: 6.1 explain the purpose of an on-site risk assessment 6.2 describe the health and safety requirements for site operations 6.3 describe the health and safety requirements for particular site conditions 6.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose 6.5 describe **safe working practices** on site 6.6 describe the potential risks to site safety and the appropriate remedial action 6.7 describe how to leave the site in a clean and safe condition.

235: Evidence Requirements / Scope

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Equipment** includes:
   (a) hand tools – including as necessary square mouth shovel, hand pick, rake, hand rammer, reinforcing bar cutters, wire cutting tools, trowel, hand tamping beam, hard bristle broom
   (b) powered equipment – including vibrotamper, powered concrete cutting equipment, powered concrete drill, powered saw, a proprietary vibrator.

2. **Sub-base material** includes:
   (a) granular sub-base type 1 material
   (b) pavement quality concrete (as described in specifications and SHW 1000)
   (c) alternative reinstatement materials (ARMs).

3. **Specifications** and **procedures** include:
   (a) Specification for the Reinstatement of Openings in Highways
   (b) Specification for Highways Works Series 1000
   (c) Health and Safety Guidance 150, *Health and Safety in Construction*
   (d) manufacturers' operating procedures for powered tools and plant.
   (e) *Safety and Street Works and Road Works – A Code of Practice*.

4. **Safe working practices** include:
   (a) safe use of tools and equipment
   (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask)
   (c) use of risk assessment methods to identify and control hazards on site
   (d) precautions to minimise danger or inconvenience to road users
   (e) precautions to minimise danger or inconvenience to site personnel
   (f) precautions to minimise damage to equipment or apparatus.

5. The **dowel bars** are steel dowel bars of 20mm or 25mm nominal diameter.

6. The **mesh reinforcement** includes standard weights of mesh reinforcement.

7. **Joints** include:
   (a) dowel bars and their assembly
   (b) tie bars
   (c) supporting cradles
   (d) contraction joints
   (e) expansion joints
   (f) warping joints
   (g) construction joints
   (h) prefabricated joint assemblies

8. The **concrete** includes:
   (a) Class 40 concrete
   (b) air entrainment additive.

9. **Safety equipment** may include as necessary:
   (a) adequate range of signing, lighting and guarding equipment (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals)
   (b) high visibility safety equipment
   (c) suitable materials to construct ramps.

10. **Types of carriageway** on which concrete slab reinstatement is carried out (AC 2.1) include:
   (a) Type 0-4 concrete and bituminous overlaid concrete roads and commercial vehicle crossings.

11. **Factors that influence the selection** of materials and equipment (AC 2.2) include:
   (a) the specification options for concrete slabs
   (b) quality control of ready mix and site-mixed concrete
   (c) the position and spacing of dowel bars and reinforcement
   (d) methods of curing concrete
   (e) the treatment of commercial vehicle access.

12. **Factors that affect the quality of the finished** concrete surface (AC 4.4) include:
   (a) visual defects – transverse, longitudinal and random cracking.

13. **Checks and tests** to confirm quality of concrete (AC 4.5) include:
   (a) profile checks – finished level in respect of surrounding surface and surface texture
   (b) concrete cube crushing test
   (c) slump test.

235: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.

Unit 236 Monitoring reinstatement of modular surfaces and concrete footways

Unit Aim

This unit is designed to allow the learner to demonstrate the skills and knowledge required to monitor the reinstatement of modular surfaces and concrete footways. The learner will be able to monitor the reinstatement of concrete blocks (or similar modules) in carriageways or footways, the reinstatement of paving slabs in footways and the reinstatement of concrete footways. The learner will also be able to monitor site safety throughout modular surface and concrete footway reinstatement.

Learning Outcome 1: Monitor the reinstatement of concrete blocks in carriageways or footways
Assessment criteria: 1.1 ensure that the **materials** selected for use are identified and checked against the current **specification** 1.2 ensure that the **equipment** is: (a) suitable to the site conditions and **materials** (b) suitable to the prescribed operation (c) in working condition and safe to use 1.3 ensure that sub-base defects are identified and made good using specified **materials** 1.4 monitor the reinstatement operation including: (a) the laying of bedding material (b) the thickness of the surcharge and compactive effort (c) the treatment of joints (d) matching and bonding of modules with existing modules 1.5 assess the **finished modular surface** to ensure the quality of the reinstatement operation 1.6 check for any problems with the reinstatement of concrete blocks and confirm the appropriate action.

Learning Outcome 2:Understand how to monitor the reinstatement of concrete blocks in carriageways or footways
Assessment criteria: 2.1 identify the **types of roads** on which the reinstatement of concrete blocks is carried out 2.2 explain the **factors that influence the selection** of **materials** and **equipment** for reinstating concrete blocks 2.3 explain how to identify different potential sub-base defects 2.4 explain how to rectify different sub-base defects 2.5 describe the **procedures** and quality checks and tests relating to: (a) laying of bedding **materials** (b) laying concrete blocks (c) jointing 2.6 explain the **factors that affect the quality** of the finished modular surface 2.7 describe potential problems with reinstatement of concrete blocks and the appropriate remedial action.

Learning Outcome 3: Monitor the reinstatement of paving slabs in footways
Assessment criteria: 3.1 ensure that **materials** selected for use are identified and checked against the current **specification** 3.2 ensure that the **equipment** is: (a) suitable to the site conditions and **materials** (b) suitable to the prescribed operation (c) in working condition and safe to use 3.3 ensure that sub-base defects are identified and made good using specified **materials** 3.4 monitor the reinstatement operation including: (a) the laying of bedding material (b) the thickness of the surcharge and compactive effort (c) the treatment of joints (d) matching and bonding of modules with existing modules 3.5 assess the **finished modular surface** to ensure the quality of the reinstatement operation 3.6 check for any problems with the reinstatement of paving slabs and confirm the appropriate action.

Learning Outcome 4: Understand how to monitor the reinstatement of paving slabs in footways
Assessment criteria: 4.1 explain the **factors that influence the selection** of **materials** and **equipment** for reinstating paving slabs 4.2 explain how to identify different potential sub-base defects 4.3 explain how to rectify different sub-base defects 4.4 explain the **factors that affect the quality** of the finished modular surface 4.5 describe potential problems with reinstatement of paving slabs and the appropriate remedial action.

Learning Outcome 5: Monitor the reinstatement of concrete footways
Assessment criteria: 5.1 ensure that the **materials** selected for use are identified and checked against the current **specification** 5.2 ensure that the **equipment** is: (a) suitable to the site conditions and **materials** (b) suitable to the prescribed operation (c) in working condition and safe to use 5.3 ensure that sub-base defects are identified and made good using specified **materials** 5.4 monitor the reinstatement operation including: (a) laying the concrete (b) compaction operations (c) concrete curing method 5.5 assess the **finished concrete surface** to ensure the quality of the reinstatement operation 5.6 check for any problems with the reinstatement of concrete footways and confirm the appropriate action.

Learning Outcome 6: Understand how to monitor the reinstatement of concrete footways
Assessment criteria: 6.1 identify the **types of footway** on which concrete reinstatement is carried out 6.2 explain the factors that influence the selection of **materials** and **equipment** for reinstating concrete footways 6.3 explain how to identify different potential sub-base defects 6.4 explain how to rectify different sub-base defects 6.5 describe the **procedures** and quality checks and tests relating to: (a) laying concrete (b) compacting concrete (c) curing concrete 6.6 explain the factors that affect the quality of the concrete surface finish 6.7 describe the checks required to ensure the quality of the **finished concrete surface** 6.8 describe potential problems with reinstatement of concrete footways and the appropriate remedial action.

Learning Outcome 7: Monitor site safety
Assessment criteria: 7.1 ensure that a risk assessment has been carried out 7.2 monitor site operations in accordance with health and safety requirements 7.3 assess site conditions in accordance with health and safety requirements 7.4 ensure that **safety equipment** is available and fit for purpose 7.5 ensure that **safe working practices** are followed in line with health and safety requirements and current relevant **specifications** 7.6 check for risks to site safety, and confirm the appropriate action required 7.7 ensure that the site is left in a clean and safe condition.

Learning Outcome 8: Understand how to monitor site safety
Assessment criteria: 8.1 explain the purpose of an on-site risk assessment 8.2 describe the health and safety requirements for site operations 8.3 describe the health and safety requirements for particular site conditions 8.4 describe the **safety equipment** required during site operations and how to ensure that it is fit for purpose 8.5 describe **safe working practices** on site 8.6 describe the potential risks to site safety and the appropriate remedial action 8.7 describe how to leave the site in a clean and safe condition.

236: Evidence Requirements / Scope
Some terms, used in the assessment criteria, cover a range of situations, as follows: 1. **Materials** include: (a) appropriate sub-base materials for making good defects (b) bedding and grouting materials for use in modular reinstatement (including sand and mortar) (c) pre-cast concrete blocks (or similar modules) to match the existing paving for reinstatement (d) natural or pre-cast paving slabs to match the existing surface for reinstatement (e) Class 30 concrete for concrete footway reinstatement (f) slip membrane (for concrete footway reinstatement) (g) curing material (for concrete footway reinstatement). 2. **Specifications** and **procedures** include: (a) Specification for the Reinstatement of Openings in Highways (b) BS 7533 Series (c) Health and Safety Guidance 150, *Health and Safety in Construction* (d) manufacturers' operating procedures for powered tools and plant (e) Application Guide 26 (f) *Safety and Street Works and Road Works – A Code of Practice*. 3. **Safe working practices** include: (a) safe use of tools and equipment (b) use of PPE (including, as necessary: high visibility jacket or waistcoat, hard hat, ear defenders, gloves, protective footwear, waterproof clothing, eye protection visor or goggles, dust mask) (c) use of risk assessment methods to identify and control hazards on site (d) precautions to minimise danger or inconvenience to road users (e) precautions to minimise danger or inconvenience to site personnel (f) precautions to minimise damage to equipment or apparatus. 4. **Equipment** includes: (a) hand tools – including as necessary square and round mouth shovels, lifting and clearing tools (hand pick, crowbar, bolster, club hammer, wire brush, hard bristle broom, rake), hand rammer, straight edge (or suitably cut) timber, trowel, textured roller. (b) powered equipment – including as necessary concrete cutting equipment, concrete saw, vibrotamper, vibrating plate. 5. **Safety equipment** may include as necessary: (a) adequate range of signing, lighting and guarding equipment (including signs, cones, signals, lamps, footway boards, barriers, portable traffic signals) (b) high visibility safety equipment (c) suitable materials to construct ramps. 6. **Types of roads** (AC 2.1) include: (a) modular surfaced carriageways and footways (b) high duty footways (c) high amenity footways .

7. **Factors that influence the selection** of materials and equipment for reinstating concrete blocks (AC2.2) include:
   (a) requirement to match materials with existing modular surface
   (b) suitable bedding materials
   (c) suitable grouting materials.

8. **Factors that affect the quality** of the finished modular surface (AC 2.6 & AC 4.4) include:
   (a) moisture content of bedding sand
   (b) thickness of surcharge and compactive effort
   (c) treatment of joints
   (d) matching of and bonding with existing modules.

9. Assessment of the **finished modular surface** (AC 1.5 & AC 3.5) include:
   (a) visual inspection – surface defects, edge depression, surface crowning, surface regularity, jointing
   (b) measurement of surface profile.

10. **Factors that influence the selection** of materials and equipment for reinstating paving slabs (AC 4.1) include:
   (a) matching and bonding modules with existing modules
   (b) suitable bedding materials
   (c) suitable grouting materials
   (d) replacement of damaged modules
   (e) treatment of joints.

11. **Types of footway** (AC 6.1) include:
   (a) concrete surfaced footways
   (b) high duty footways
   (c) high amenity footways.

12. Assessment of the **finished concrete surface** (AC 5.5) includes:
   (a) visual inspection for transverse, longitudinal and random cracking
   (b) profile checks on finished level in respect of surrounding surface and surface texture.

13. **Procedures** for reinstating concrete (AC 6.5) include:
   (a) quality control of site-mixed and ready –mix concrete.

236: Assessment Requirements
Assessment for this unit consists of practical observations and knowledge questioning to cover the requirements of the learning outcomes. Current requirements for practical observations, including assessor and verifier qualifications and facilities requirements are provided in the joint awarding organisation centre document.