

## National Unit Specification: general information

<b>UNIT</b>	Construction Measurement and Description (Higher)
<b>NUMBER</b>	D22S 12
<b>COURSE</b>	Quantity Surveying (Higher)

### SUMMARY

This unit is suitable for candidates who have some prior knowledge of or interest in construction technology, particularly of domestic construction. The unit concerns the measurement and description of building works otherwise known as ‘billing’ of building works. The term ‘billing’ comes from the document ‘bill of quantities’ which is often prepared in order to measure and describe the work involved in a building project. Builders’ estimators then use the bills of quantities in order to build up a price for the proposed contract.

In this unit skills will be developed in the measurement and description of building works in accordance with a relevant standard method of measurement.

On completing the unit, candidates will have a solid grounding in the processes and preparation of bills of quantities. They will also inevitably discover that their knowledge of domestic building construction has increased. The unit will provide the basis for further study in quantities at Higher National Level.

### OUTCOMES

- 1 Explain the purpose and use of bills of quantities.
- 2 Prepare draft bills of quantities of preliminaries for minor works.
- 3 Prepare draft bills of quantities for brickwork and blockwork items.
- 4 Prepare draft bills of quantities for carpentry and joinery work items.
- 5 Prepare draft description of works for alterations and refurbishment works.

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### Administrative Information

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**RECOMMENDED ENTRY**

Whilst entry is at the discretion of the centre, it would be beneficial for candidates to have a knowledge of domestic building construction and basic numeracy skills.

**CREDIT VALUE**

1 Credit at Higher.

**CORE SKILLS**

Information on the automatic certification of any core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

# National Unit Specification: statement of standards

## UNIT Construction Measurement and Description (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

### OUTCOME 1

Explain the purpose and use of bills of quantities.

#### Performance criteria

- a) The purpose of different formats for bills of quantities are described correctly.
- b) The purpose of standard methods of measurement is described correctly.
- c) The use of bills of quantities for tendering purposes is explained correctly.
- d) The use of bills of quantities post-contract are explained correctly.

#### Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

### OUTCOME 2

Prepare draft bills of quantities of preliminaries for minor works.

#### Performance criteria

- a) Items drafted are in harmony with a given standard method of measurement.
- b) Items drafted are reasonably comprehensive for a given project.

#### Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

### OUTCOME 3

Prepare draft bills of quantities for brickwork and blockwork items.

#### Performance criteria

- a) Draft bills of quantities are presented in a standard format complete with waste calculations.
- b) Item descriptions are complete and in harmony with a given standard method of measurement.
- c) Quantities produced are accurate.
- d) Drawings are interpreted correctly.

## National Unit Specification: statement of standards (cont)

**UNIT** Construction Measurement and Description (Higher)

### Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

### OUTCOME 4

Prepare draft bills of quantities for carpentry and joinery work items.

### Performance criteria

- a) Draft bills of quantities are presented in a standard format complete with waste calculations.
- b) Item descriptions are complete and in harmony with a given standard method of measurement.
- c) Quantities produced are accurate.
- d) Drawings are interpreted correctly.

### Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

### OUTCOME 5

Prepare draft description of works for alterations and refurbishment works.

### Performance criteria

- a) Draft description of works is presented in a recognised format.
- b) Draft description of works is comprehensive in scope.
- c) Descriptions are reasonably comprehensive and incorporate adequate technical details.
- d) Drawings are interpreted correctly.

### Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

## EVIDENCE REQUIREMENTS FOR THE UNIT

### Outcome 1

For this outcome, written and/or oral evidence is required indicating a knowledge and understanding of:

- i) the different formats for bills of quantities and their advantages and limitations;
- ii) the purpose of standard methods of measurement;
- iii) the use of bills of quantities during the tendering process;
- iv) the uses of bills of quantities during the post-contract periods.

‘Closed book’ assessment should be used for this outcome.

## National Unit Specification: statement of standards (cont)

**UNIT** Construction Measurement and Description (Higher)

### Outcome 2

For this outcome, written and/or oral evidence is required indicating an ability to draft bills of quantities for preliminaries which are:

- i) in harmony with a given standard method of measurement;
- ii) reasonably comprehensive for a given project.

‘Open book’ assessment should be used for this outcome with a standard method of measurement (e.g. SMM7) and other documents and drawings given as required.

### Outcome 3

For this outcome, written and/or oral evidence is required indicating an ability to draft bills of quantities for brickwork and blockwork items that are:

- i) in a standard format;
- ii) include all necessary waste calculations;
- iii) in harmony with a given standard method of measurement;
- iv) accurate in the calculation of quantities;
- v) in harmony with given drawings.

‘Open book’ assessment should be used for this outcome with a standard method of measurement (e.g. SMM7) and other documents and drawings given as required. Building price books etc may be used to extract technical detail to add to item descriptions. Evidence is required covering both brickwork and blockwork in superstructure as well as associated items such as forming cavities, closing cavities, damp proof courses, lintels, sills etc.

### Outcome 4

For this outcome, written and/or oral evidence is required indicating an ability to draft bills of quantities for carpentry and joinery work items that are:

- i) in a standard format;
- ii) include all necessary waste calculations;
- iii) in harmony with a given standard method of measurement;
- iv) accurate in the calculation of quantities;
- v) in harmony with given drawings.

‘Open book’ assessment should be used for this outcome with a standard method of measurement (e.g. SMM7) and other documents and drawings given as required. Building price books etc may be used to extract technical detail to add to item descriptions.

## National Unit Specification: statement of standards (cont)

**UNIT** Construction Measurement and Description (Higher)

Evidence is required covering one of the following elements:

- floors and flooring complete with skirtings
- a timber glazed screen complete with glazing and a glazed door
- timber stud partitions complete with doors, doorways and surrounds
- windows, external doors and ironmongery complete with surrounds
- trussed rafters and associated bearers etc complete with associated ironmongery (holding down straps etc.)

### **Outcome 5**

For this outcome, written and/or oral evidence is required indicating an ability to draft descriptions of works for alterations and refurbishment work that:

- i) are in a recognised format;
- ii) are reasonably comprehensive;
- iii) incorporate adequate technical detail;
- iv) are in harmony with given drawings.

‘Open book’ assessment should be used for this outcome with drawings and specification information given as required.

Evidence is required covering a project, which entails alteration and refurbishment to, for example, either a self-contained flat, a dwelling house or a section of a larger building. The scope of project must cover several different trades.

It is stressed that the description of works is not to be drafted in accordance with a standard method of measurement. Neither is the description of works required to contain any quantified information.

# National Unit Specification: support notes

## UNIT Construction Measurement and Description (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

### **GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT**

This unit dovetails with other Higher units on 'Building Estimating' and 'Tenders and Contracts'. The context for these units is largely domestic construction.

'Construction Measurement and Description' is in the most part concerned with works of a minor or domestic nature. Nevertheless, it would clearly benefit candidates if they could cover aspects of their learning in a context of larger or more complex projects.

Corresponding to outcomes 1-5:

#### **Outcome 1**

The purpose and uses of bills of quantities should be studied not merely with pre-contract estimating in mind. Candidates should be helped to consider the use of these documents in post-contract work including interim valuations, valuation of variations, buying and project management. Furthermore, the use of the bills by both the contractor and the consultants should be covered.

#### **Outcome 2**

The study of preparing preliminaries for bills of quantities should be tied in with the candidate's study of contract law and contracts. The preliminaries set the context for the contractors' tender and form part of the contract documentation on which that offer is based.

#### **Outcomes 3 and 4**

This unit is designed to introduce candidates to the skills of measurement and description of construction works. A candidate's skill in this area is to some extent dictated by his or her knowledge of construction technology. It is for this reason that the scope of the unit does not cover highly technical areas such as building services or underpinning works. It is hoped that the scope of the outcomes given will allow candidates to readily comprehend the materials and technology involved. Brickwork and blockwork as well as carpentry and joinery work are two of the basic trades. Work in these trades can be readily viewed and discussed by candidate groups and their tutors.

Clearly it should be beneficial for candidates to be exposed to the complete scope of building works. This can be done by touring existing buildings or building sites as well as by examining architects' drawings. Nevertheless, for purposes of assessment, the trades covered in the outcomes should be considered adequate.

## National Unit Specification: support notes (cont)

**UNIT** Construction Measurement and Description (Higher)

### **Outcome 5**

With regard to descriptions of works it would be suitable to deal mostly with a domestic context. It would, nevertheless, be useful to expose candidates to projects of a light industrial or commercial nature. The types of project that would be useful for assessment purposes may involve slapping openings, demolitions and duntakings, new or extended building services, new partitions, new or altered kitchen or bathroom facilities etc. In an industrial or commercial context the works may include new rooms, new ceilings, redecoration, new or extended services, new floor coverings etc.

### **Outcomes 3, 4 and 5**

Candidates should be made aware of different standard methods of measurement. Perhaps it would be possible to let candidates examine a civil engineering method of measurement. Nevertheless, it would clearly be sensible to concentrate heavily on one standard method of measurement. At the time of writing of this unit the pre-eminent standard method of measurement for building works is SMM7.

Descriptions of works do not require a standard method of measurement. The whole idea of such a document is to aid the estimator but without highly technical or quantified information.

### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

The unit should be presented in domestic or light industrial/commercial context. The learning and teaching should be made as agreeable as possible by making extensive use of images and technology with which the candidate is familiar or which they might find interesting. To this end tutorial exercises might be based on the buildings in which candidates work or study. Use can also be made of technical press where attractive visual material will be readily available along with useful cost and quantitative information in the form of cost analysis.

Stress should be given to the positive contribution made by accurate tender documentation to the pricing, cost control and site management of the project.

The advantages and limitation of different formats of bill of quantities layout – trade, elemental, operational, work section etc – may be readily discerned by candidates when carrying out tutorial exercises in producing small draft bills of quantities for particular project types or with particular recipients in mind.

Site visits would be valuable particularly for candidates with a limited knowledge of the building process and construction technology. Such visits would be a valuable opportunity to *describe* the various elements, components and materials involved in building works and to discuss how these should be *measured*. During such visits the ordering of materials could also be discussed. This would be a valuable exercise because although brickwork, for example, might be measured in square metres, the materials or bricks, cement and sand – are bought in thousands, bags or tonnes respectively.

## National Unit Specification: support notes (cont)

### UNIT Construction Measurement and Description (Higher)

Site visits would also be extremely useful in discussing the composition of preliminaries information for bills of quantities. Many of the items in preliminaries bills are only able to be viewed on site – e.g. scaffolding, site huts and welfare facilities, security measures etc. A lesson held on site would leave an impression on the mind. When candidates discuss problems of site access literally in full view of the restrictions and come to conclusions themselves they will fully appreciate the need for clear and comprehensive preliminaries information. In this way they will also learn empathy for the estimator that must price the contract from the information given.

Extensive use should be made of old copies of bills of quantities, descriptions of works and contract drawings in tutorial work. Candidates should be helped to be aware of the importance of an overall package of co-ordinated and harmonious contract information. Certain aspects of bill production can appear daunting to the uninitiated, preparation of specifications for example. In order to allay candidates' fears that they might have to produce a lever-arch file full of technical documentation it might be wise to physically subdivide the sample bills into separate trades or work sections. It would then be worth emphasising that the assessment regime requires production of measurement sections without highly technical specification sections. It should further be emphasised that assessment work is open book for outcomes involving billing and measurement.

It may prove valuable to allow candidates to examine building price books at some length. These demonstrate how unit rates for individual items of work are built up or calculated and this points to the most obvious use of bills of quantities and descriptions of works. These price books frequently contain other information of more than passing interest to candidates studying building costs.

It would not be unfair to describe building price books as visually unattractive. The use of manufacturers' technical literature is therefore to be encouraged in order to help candidates obtain a visual grasp of construction work.

Visits to consultant quantity surveyors' offices and contractors' estimating and surveying departments may also prove beneficial. These will permit candidates to see both sides of the construction cost 'fence' and question surveyors and estimators about the theory and realities of producing and pricing tender documentation.

In an age where electronic commerce is becoming well established it may seem sensible to use computerised billing packages both in tutorial and assessment work. There is no requirement to use a purely manual system for production of draft bills for this unit. It may however be impossible in the timescale of teaching and learning to become familiar with take-off procedures and a standard method of measurement *and* learn how to use a new computer application. It would nevertheless be useful for candidates to be aware of state-of-the-art technology and indeed have first hand experience in using it.

It could also be argued, however, that learning how to prepare bills manually will give candidates invaluable skills that they will employ when carrying out on-site re-measurements as well as measurement of variations both on site and from drawings. There is also a danger that over-reliance on computer technology and standard data bases of item descriptions will leave the learner without the skills or confidence to draft clear, concise yet readable descriptions for non-standard work items, particularly for alteration, repairs and refurbishment work.

## National Unit Specification: support notes (cont)

### UNIT Construction Measurement and Description (Higher)

The final outcome (outcome 5) specifically relates to alterations and refurbishment works. It would likely be effective to learn how to draft items for such documents by visiting actual projects of this nature or at least touring a building or room that clearly needed to be refurbished. During such a visit the candidates could be encouraged to talk out loud about the work required at the site. By verbalising the work requirements they are in a way producing a 'description of the works' if not an actual description of works. During such tours the candidates may be guided by the tutor to become clear, concise and technical in their verbal descriptions. By examining examples of actual descriptions of works the candidates can 'tighten up' their descriptions into a standard format and ultimately attempt the assessment of their newly acquired skills.

Another skill that may be acquired by site visits to existing premises is that of on-site note taking. This is a key skill and vital for preparation of clear and comprehensive tender documentation for both new buildings and alterations work.

### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

Centres may use the Instruments of Assessment, which they consider most appropriate. Where, however, information gathering from drawings for example is undertaken in teams, observation checklists should be used to record individual participation in such work.

Examples of suitable instruments of assessment are given below, including an integrated assignment for outcomes 2, 3 and 4.

#### **Outcome 1**

Candidates could be set a question paper comprising a number of restricted and extended response questions on:

- i) formats of bill of quantities and the purpose of each;
- ii) the purpose of standard methods of measurement;
- iii) the use of bills of quantities in the tendering process;
- iv) the uses of bills of quantities in the post-contract period.

#### **Outcome 2**

Candidates could be set an assignment to prepare a preliminaries bill for minor works such as a new dwelling house or alterations to an existing retail or office premises. Architects' and other drawings and schedules should be given to the candidates. An appropriate standard method of measurement should also be provided. Where there appears to be any lack of information, candidates should be under instruction to make reasonable assumptions.

#### **Outcome 3**

Candidates will be set an assignment to take off quantities for superstructure brickwork, blockwork and related items. Drawings, specification details and a standard method of measurement would be provided. The building type could be a new dwelling house or other straightforward framed structure.

## National Unit Specification: support notes (cont)

**UNIT** Construction Measurement and Description (Higher)

### **Outcome 4**

Candidates could be set an assignment to take off quantities for specific carpentry and joinery work items from one element of a building. Drawings, specification details and a standard method of measurement would be provided. The building type could be a new dwelling house or other straightforward unframed structure.

### **Outcome 5**

Candidates could be set an assignment to produce a description of works for all trades for alterations and refurbishment work. The task should only cover work items. Preliminaries items are not to form part of the task. Drawings and specification notes are to be provided. The drawings should depict alterations and refurbishment etc to existing premises such as a flat, a house or light industrial or commercial premises. It may be advantageous to relate assignment work to a 'live' project or proposal, but this is not essential. Candidates should be asked to make reasonable assumptions where there appears to be any lack of information.

### **SPECIAL NEEDS**

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).