

National Unit Specification: General Information

UNIT Building Estimating (Higher)

NUMBER D911 12

COURSE

SUMMARY

This unit is suitable for candidates who have some prior knowledge of construction technology, particularly of domestic construction. The unit concerns the pricing of building works from tender documents and includes the measurement of quantities, calculation of unit rates and compilation of materials schedules. Skills will be developed in construction measurement and the calculation and presentation of unit rate build-ups and materials schedules.

On completing the unit, candidates will have a sound knowledge of the processes involved in straightforward building estimating. The unit will provide the basis for further study in quantities and estimating at Higher National level.

OUTCOMES

- 1 Describe the typical tender documents found in domestic construction projects.
- 2 Take off measurements of quantities from drawings for minor domestic construction projects.
- 3 Produce unit or composite rates for items of construction work and apply these to minor domestic works.
- 4 Compile schedules of materials for minor domestic construction projects.

Administrative Information

Superclass: TF

Publication date: December 1998

Source: Scottish Qualifications Authority

Version: 01

© Scottish Qualifications Authority 1999

This publication may be reproduced in whole or in part for education purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this specification can be purchased from the Scottish Qualifications Authority. The cost is £2.50.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, it would be beneficial for candidates to have successfully completed the units:

Building Technology: Principles and Processes (Higher)
Building Technology: Components and Finishes (Higher)

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 Building Estimating (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

Describe the typical tender documents found in domestic construction projects.

Performance Criteria

- a) The typical tender documents found in domestic construction projects are listed correctly.
- b) The uses of typical tender documents found in domestic construction projects are described correctly.

Note on range for the outcome

Types of documents: architect's drawings; engineer's drawings; specifications; descriptions of works; bills of quantities.

Evidence Requirements

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

- i) the different types of tender documents provided for builders at pricing stage;
- ii) the usefulness of the different documents individually and in combination in providing information to help the builder's estimator.

'Closed book' assessment should be used for this outcome.

OUTCOME 2

Take off measurements of quantities from drawings for minor domestic construction projects.

Performance Criteria

- a) Quantities are measured from given drawings in a standard and presentable format.
- b) Quantities are measured to an appropriate accuracy and in appropriate units of measurement.

Evidence Requirements

For this outcome, written and/or oral evidence is required indicating:

- i) a knowledge and understanding of the principles of the measurement of construction works in the context of estimates for minor domestic projects;
- ii) an ability to prepare comprehensive lists of quantified item descriptions of building work suitable for minor domestic projects.

National unit specification: statement of standards (cont)

UNIT Building Estimating (Higher)

'Open book' assessment should be used for this outcome.

OUTCOME 3

Produce unit or composite rates for items of construction work and apply these to minor domestic works.

Performance Criteria

- a) Unit or composite rates are produced using a standard procedure.
- b) Resultant rates are within normal tolerances, complete and employing current pricing information.
- c) Unit or composite rates are applied correctly to measurements of building works to produce an overall estimate.

Evidence Requirements

For this outcome, written and/or oral evidence is required indicating:

- i) an ability to consistently employ a standard procedure for building up unit or composite rates;
- ii) an ability to source current basic cost information on labour, plant and materials;
- iii) an ability to apply unit or composite rates to measured quantities in order to produce an overall estimate.

'Open book' assessment should be used for this outcome.

OUTCOME 4

Compile schedules of materials for minor domestic construction projects.

Performance Criteria

- a) Schedules of materials for minor domestic building works are comprehensive.
- b) Schedules of materials produced are accurate and include a reasonable allowance for waste.

Evidence Requirements

For this outcome, written and/or oral evidence is required indicating:

- i) a knowledge and understanding of the basic units of purchase of components and raw materials for building works;
- ii) an ability to translate unit and composite rate information into component and raw material purchase information.

'Open book' assessment should be used for this outcome.

National unit specification: support notes

UNIT Building Estimating (Higher)

This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

GUIDANCE ON CONTENT AND CONTEXT

This unit is designed to extend candidate's knowledge and understanding of domestic construction technology, concentrating on minor works. It considers the documents normally provided by clients or their architects for the builder's estimator to produce an estimate for the project. It ultimately takes the project a step beyond the estimate by assuming that the tender is successful and that a schedule of materials is required so that orders can be placed with builders' merchants.

It is not intended that measurement be carried out in accordance with any of the published standard methods of measurement (eg. SMM7). Rather, measurements should be in the form of approximate or 'builder's' quantities.

Corresponding to outcomes 1 to 4:

- 1 This outcome should provide the candidate with a knowledge of the range of tender documents provided by clients or architects in order for builders to provide an estimate or offer for the building works. The candidates should come to appreciate that sometimes all that is provided are drawings and specifications but that on other occasions descriptions of works or even bills of quantities are provided to assist them.

Candidates should be made aware of standard methods of measurement (eg. SMM7) but also come to appreciate that the use of such standard methods of measurement are not obligatory and not always required, especially for minor projects.

- 2 This outcome should provide candidates with an ability to quickly and accurately describe and measure items of building work from drawings in order to assist in the pricing of the work. Whilst appreciating that standard methods of measurement exist, candidates should be encouraged to employ a method of 'approximate' or 'builder's' quantities, combining items of work or components where appropriate to reduce the time taken for the take-off.

Candidates should learn to be more careful in their measurement of costly items such as square metres of facing brickwork and appreciate that less attention is required with relatively inexpensive items such as linear metres of softwood skirting. It is not intended that the measurement of 'specialist' items such as electrical work and alternations to switchgear form a major or complex part of assignments – such items may be dealt with by means of composite items or provisional sums.

National unit specification: support notes (cont)

UNIT Building Estimating (Higher)

It is intended that this outcome be achieved in the context of projects of a straightforward domestic nature, for example detached garages or simple house extensions of one or two storey height.

It is suggested that the building projects considered should encompass the following trades:

- builderwork (including drainage)
- carpenter and joinerwork (including glazing)
- roofing work
- plaster and roughcast
- painter work
- electrical work
- plumber work

- 3 This outcome should provide candidates with an ability to compile basic cost of information on labour, plant and materials and apply that information to produce unit or composite rates for building works. For example, the cost of sand, cement and aggregate can be established and along with the cost of a mixer and labourer, can be used to calculate a cost per cubic metre for concrete. Similarly the cost of a preglazed window can be established and combined with the cost of fixings, mastic pointing and painterwork materials as well as the labour involved in fixing and decorating the window, to produce a resultant composite rate for that window.

Candidates must use their knowledge of construction technology in order to establish all the individual items that go together to produce a completed piece of building work. Access to textbooks and detailed drawings should be provided to facilitate this task.

Candidates should be taught to annotate their build ups of unit or composite rates and make reference to the sources of cost information employed to compile these rates.

It is anticipated that extensive use be made of manufacturers' literature, building price books and price lists from builders' merchants and plant hire companies during the collection of initial cost information. Plant and labour outputs should be obtained from estimating texts and price books as well as manufacturers' literature, although where applicable a candidate's personal experience of construction outputs may be employed.

National unit specification: support notes (cont)

UNIT Building Estimating (Higher)

- 4 This outcome should provide the candidate with the knowledge and ability to produce schedules of basic materials required to complete a minor domestic building project. It is intended that they learn to appreciate the basic form in which materials are ordered and the standard lengths or weights of such materials. For example, sand for concrete or mortar may be bought loose by the tonne whereas cement or lime will likely be purchased by the bag in units of 25 kg.; timber is normally purchased in standard lengths and plasterboard comes in standard sheet sizes.

Candidates will be expected to research the finer aspects of each item and include in their materials schedules. For example, the number of tubes of mastic pointing required and the number of boxes of different types of nails and screws required for the project.

Candidates should be made aware that the functions of estimating and buying are often combined in small to medium contracting organisations. Therefore this outcome should be seen as a natural progression from outcomes 2 and 3, and indeed may be achieved by an integrated task (see 'Guidance on Approaches to Assessment').

GUIDANCE ON TEACHING AND LEARNING APPROACHES

The unit should be presented in a domestic context (housing). Nevertheless, candidates should come to appreciate how the skills learned in this unit could be applied also to major construction projects.

Outcomes 2, 3 and 4 should concentrate on method and presentation of information. It should be emphasised that documents produced during these outcomes would, in a real life situation, be used by other members of the builder's team and should be readily understood and carefully annotated.

Learning in outcome 1 would be facilitated by showing candidates examples of different types of tender documentation. This, along with critical discussion among the class should build understanding of the use of each document type and how different documents must be read with others.

Carefully selected site visits may assist candidates in appreciating the scale and nature of minor domestic building projects. This will also help candidates consider realistically the cost impact of limited access and working space if these apply to any particular project, as well as highlighting temporary works and health and safety provisions. The viewing of house extension projects on site will provide candidates with a visual grasp of the work involved in tying in new to existing structures, slapping openings in existing walls, tying in new to existing roofs and the general inconvenience of carrying out building operations in extension to an occupied dwelling house.

National unit specification: support notes (cont)

UNIT Building Estimating (Higher)

It is not intended that the candidates learn for this unit to take off quantities by means of an established standard method of measurement such as SMM7. Nevertheless, an exposure to previously prepared bills of quantities (draft and/or finished articles) based upon standard methods of measurement may assist candidates to grasp some of the principles of measurement and description of building works inherent in such documents. If nothing else, candidates should be aided to grasp the benefits of careful layout and side notes by examining suitable examples.

Although its use is not required for assessment purposes, SMM7 or similar standard method of measurement may prove useful in familiarising candidates within preliminary item which must be costed over and above the actual construction work (for example, scaffolding, security, welfare facilities, health and safety and the like).

It may be of benefit to candidates to examine manufacturers' literature and price lists, even if these items are not current. Of particular value would be literature that contains information on standard purchasing batches, standard lengths or sections of material and information on coverages etc. Reasonably current cost information must be used for the purposes of assignment work. Collating information in the form of relevant manufacturers' literature and current materials prices and plant hire rates may be an activity allocated to teams rather than individuals. It may be practical for candidates to be given access to data held at the centre in this regard instead of multiple enquiries being made of local builder's merchants.

Different estimating textbooks contain different approaches to the build up of unit rates but all adhere to the same basic principles. Exposure to a number of different approaches is therefore not necessarily a bad thing. Nevertheless, candidates should be encouraged to be consistent in their adopted approach and it may be wise for centres to insist that all candidates adopt the same basic method in their own work.

It is important for candidates to acknowledge that building operatives do not all work at the same pace and that the same operatives will work at different levels of output in different circumstances. Examination of estimating textbooks, building price books and discussions in class may prove valuable in exploring this critical aspect of building estimating.

National unit specification: support notes (cont)

UNIT Building Estimating (Higher)

Candidates will likely become more skilful and accurate estimators if they can appreciate how materials and components are ordered. To this end manufacturers' and merchants' literature and even old materials purchase orders may be examined to familiarise candidates with the units in which actual purchase of materials is made. Bills of quantities may be used to good effect to demonstrate that the unit of measurement for an item of work need not be the same as the unit in which the basic materials for that item are purchased. For example, concrete may be measured in cubic metres but sand and aggregate are likely purchased by the tonne and cement is purchased by the bag (25 kg) albeit probably in bulk. Even with ready-mixed concrete, which has a price per cubic metre, there is the 'extra' cost of purchasing less than a full 6 cubic metre load which may apply to many minor domestic building projects. Candidates should be exposed as far as possible to these idiosyncrasies in their learning in order to add realism to their estimates.

GUIDANCE ON APPROACHES TO ASSESSMENT

Centres may use the Instruments of Assessment which they consider most appropriate. Where, however, information gathering 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) the types of tender documents found in domestic construction projects;
- ii) the information which the estimator can extract from each document and the use to which the information is put in arriving at an estimate for the overall project.

Outcome 2

Candidates could be set an assignment to take off quantities from given drawings for a minor domestic building project such as a house extension or detached garage. The drawings should provide sufficient information for a reasonably comprehensive take-off, but where such information is lacking the drawings should be accompanied by specification information and/or a description of works.

This assignment should be tackled using 'approximate' or 'builder's' quantities and the use of published standard methods of measurement is not required.

National unit specification: support notes (cont)

UNIT Building Estimating (Higher)

Outcome 3

An assignment could be used requiring candidates to produce unit or composite rates for a range of main trades items including builderwork, carpenter and joinerwork, roofing work, plaster and roughcast work, painterwork and services trades items. The items could be provided by means of a list, by means of an extract from bills of quantities or by means of the information generated from outcome 2.

An observation checklist would be required where applicable to record candidate's full and active participation in any groupwork in sourcing basic cost information. An overall estimate should be produced by this assignment including a realistic allowance for preliminaries, profit and overheads.

Outcome 4

Assessment for this outcome could be based on extracts from bills of quantities or quantified descriptions of works with candidates being given the assignment of translating the given information into materials purchase schedules. The given information could, of course, be taken directly from the information compiled in outcomes 2 and 3.

Integrated Assessment

The evidence for outcomes 2, 3 and 4 could be generated by using an integrated assignment whereby candidates play the role of estimator/buyer, provided with drawings, specifications and possibly a description of works and thereafter be required to produce quantified item descriptions and unit and composite rates thereafter applying these to produce an overall estimate including preliminaries, profit and oncosts. Finally, they should produce schedules of materials for buying purposes. The schedules of materials could of course, be compiled as a step towards the production of the overall estimate and not as an 'afterthought'.

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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements* (SQA, 1998).