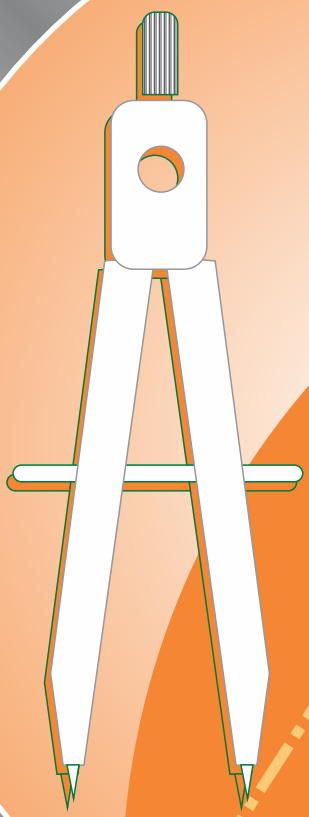
N4 Quantity Surveying



Gateways to Engineering Studies - C J Bam & A F May

HYBRID LEARNING SOLUTIONS

Gateways to Engineering Studies

Quantity Surveying
N4

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Foreward

This book has been produced as a guide to those students studying for the N DIPLOMA IN BUILDING with Quantity Surveying as one of the core subjects. In writing this book the authors, will be attempting to assist students who experience difficulty with the practical application of this subject and trust that it will go a long way in improving the proficiency and effectiveness of the students studying towards the N DIPLOMA at FET [TVET] Colleges in South Africa.

Although this book has been developed primary to assist the above students, it is hoped that students at tertiary institutions will find this book a useful guide and study aid.

All examples in this book have been based on the Sixth Edition of the Standard System with amendments. The sketches depicted in this book should act only as a guide to the measurements and the students are advised to become acquainted with the latest building construction methods and details being used in the industry today.

The book deals only with certain elements in the construction of a small house- it is the intention of the authors to produce books with more advanced examples not used in this book for the N5 and N6 grades.

Building Measurement is divided into two sections:

1: Elementary theory and
2: Practical measurements.

The first section discusses briefly some of the aspects of a professional quantity surveyor's duties, relationship with other professional persons and resources being utilised by the quantity surveyor. The second section provides examples in measuring from the foundations and progressing up to the roof construction and ceilings. The aim of the authors have been to provide the method and the procedure for students to follow and work through and has been based solely on the prescribed syllabus for the N4 course and trust that it will provide the students with the basic principles for taking-off.

Contents

We use different icons to help you work with this book; these are shown in the table below.

Icon	Description	Icon	Description
	Assessment / Activity		Multimedia
	Checklist		Practical
	Demonstration / Observation		Presentation/ Lecture
	Did you know?		Read
	Example		Safety
	Experiment		Site visit
	Group work/ discussions, role - play, etc.		Take note of
	In the workplace		Theoretical - questions, reports, case studies, etc.
	Keywords		Think about it

Module 1

Building Measurement

Learning Outcomes

On the completion of this module the student must be able to:

- Describe the purpose of Quantity Surveying N4: Building Measurement
- Describe the two sections that Building Measurement consists of

1.1 Introduction

The object of this course is the introduction in elementary quantity surveying for those students employed in the Building Industry and it's Allied Trades. After completion of this course the student should be able to measure accurately the quantity of material and labour for a small dwelling. This is designed for the Quantity Surveyor's assistant.

Quantity surveying requires great precision and accuracy and the Quantity Surveyor should have a wide knowledge of building construction.

It is recommended that the student should enhance his knowledge by attending symposiums, lectures, taking part in debates, discussing and reading all the trade journals in order to be up to date with the latest technology, materials and methods used on construction sites, in the contractor's head offices and the professional Quantity Surveyor's offices.

Some of the most popular journals being:

- The SA Builder
- Project Pro
- Construction World
- And any building related magazine

Architects and Engineers are responsible for the design aspects of construction projects.

Contractors are responsible for the erection of those projects and the Professional Quantity Surveyor measures from architects' drawings to derive quantities in order to determine directly or indirectly the costs of construction work of all kinds, as well as the consequential costs incurred by owners and occupiers after the completion of construction projects.

Apart from the above we also get the quantity surveyor working as the building surveyor / construction surveyor for the contractor, the separate and varied duties of the two different individuals will be discussed in the following modules.

The Quantity Surveyor is frequently referred to as the cost consultant / accountant of the building industry and can be found in any of the following disciplines:

- Quantity Surveying
- Construction Surveying
- Valuators
- Property Development
- Project Management
- Consultants
- Government employees

The syllabus for N4 consists of the following three sections:

- Sketches and drawings
- Theory
- Practical measurements

Activity 1.1

1. Describe the purpose of Quantity Surveying and building measurement.
2. Describe the sections that Building Measurement is divided into.

Self Check

I am able to:	YES	NO
• Describe the purpose of Quantity Surveying N4: Building Measurement	○	○
• Describe the two sections that Building Measurement consists of.	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 2

Sketches and Drawings

Learning Outcomes

On the completion of this module the student must be able to:

- Describe why the ability to sketch freehand in good proportions is required

2.1 Introduction

The Quantity Surveyor in measuring quantities (Taking-off) from the architect's drawings is putting into words the architect's ideas and designs in order for the builders to estimate competitively, on the same quantities, descriptions and specifications.

2.2 Freehand sketches

The ability to sketch freehand in good proportions will assist the QS in discussions and explanations as well as for taking and recording information. They liaise with Architects, Engineers and professional men as well as with the site personnel.

The professional's ability to aid discussions with sketches will be useful. In order to elucidate information given in the Bills of Quantities it is the practice to attach drawings or sketches, showing details of a particular work.

In preparing Bills for alterations and existing works the QS will amplify his observations with sketches and annotations to assist him and to jog his memory at a later stage.

The QS also uses sketches to fill in features not recorded on the architect's drawings and to enhance the quality of his "dims" (the actual measurements booked).

2.3 Examples of different construction sketches:

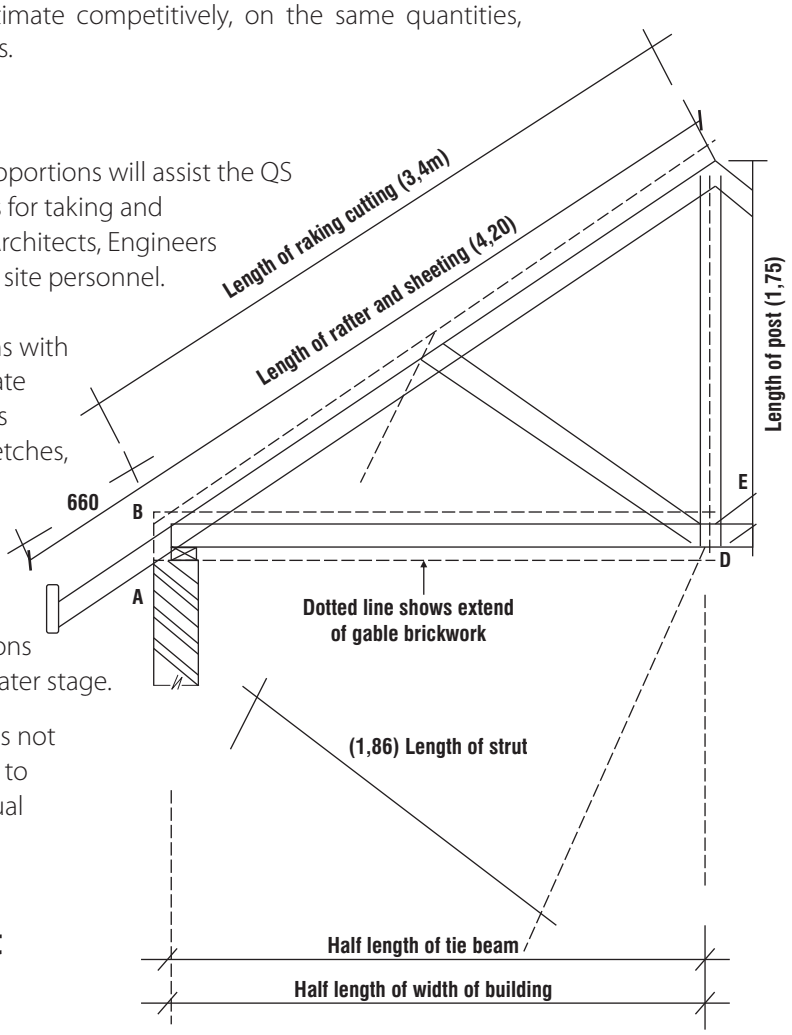


Figure 2.1 Section of half truss with open eaves

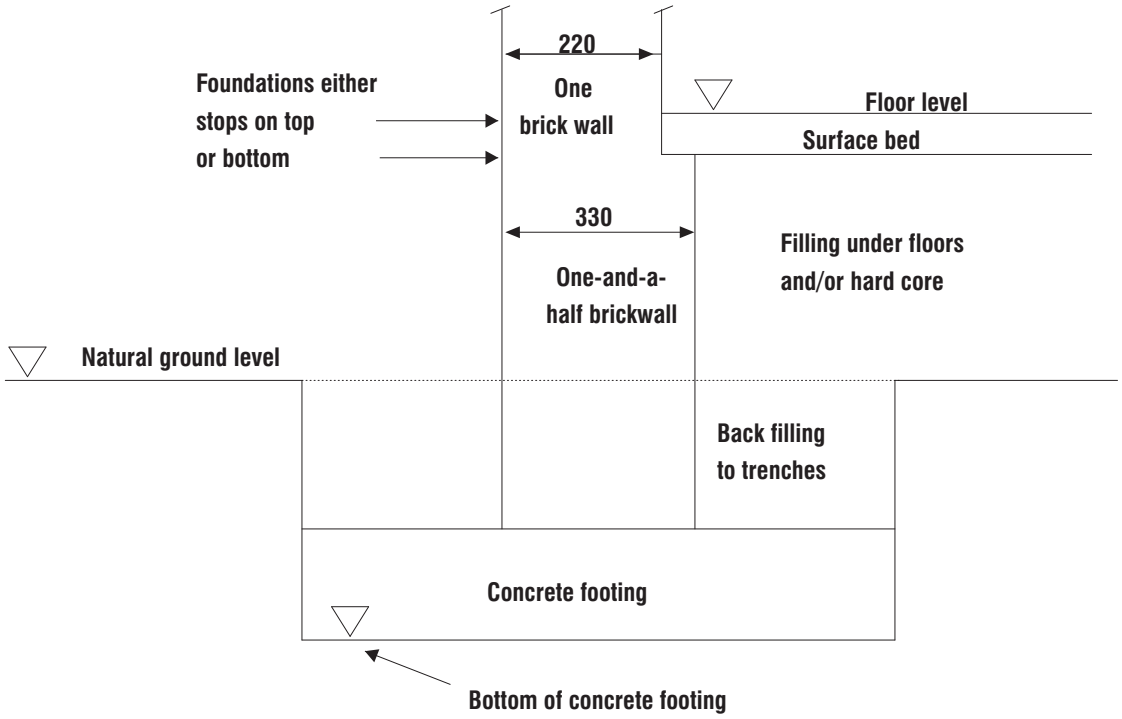


Figure 2.2 Section Through a Typical Foundation

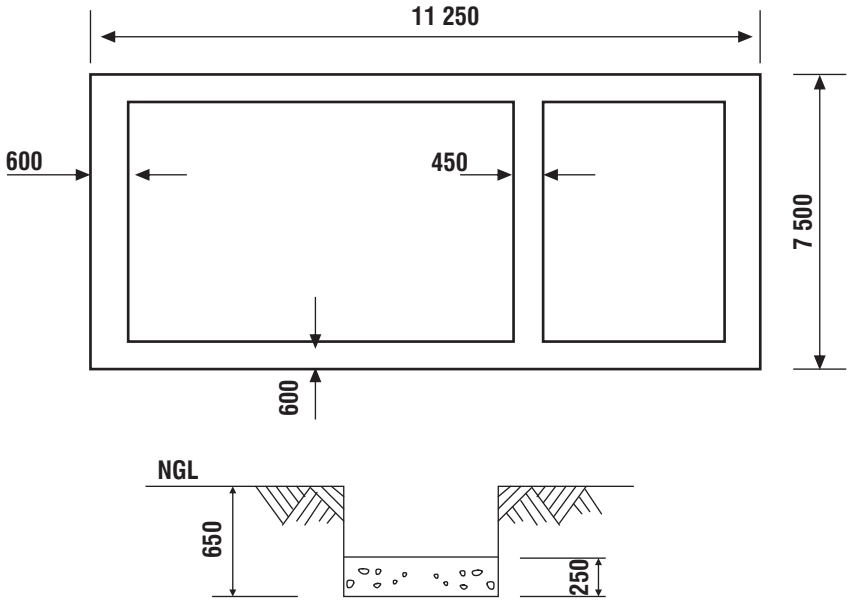


Figure 2.3 Foundation Plan and Section of Trench

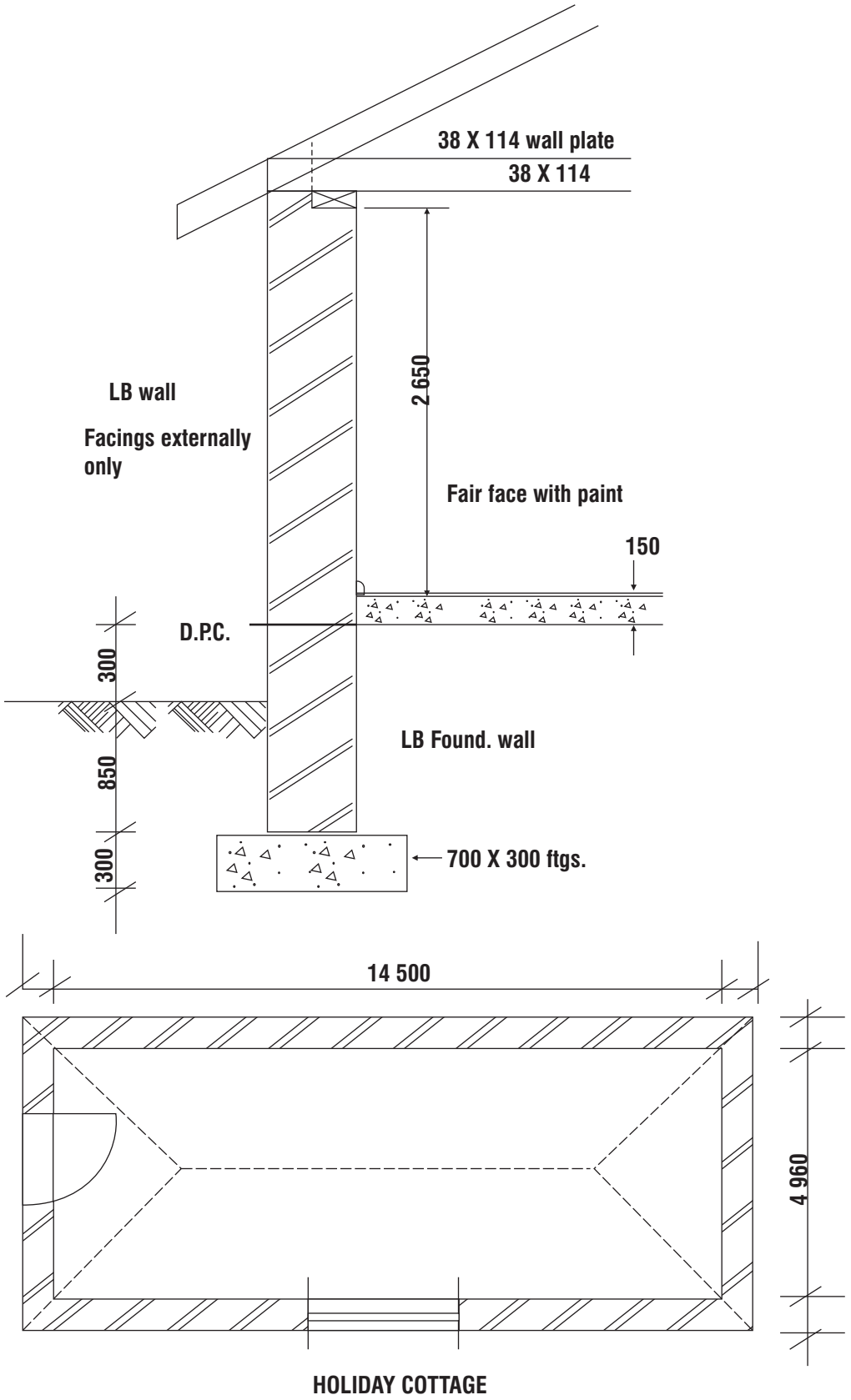


Figure 2.4 Section through full height of brick wall, floor and roof.

Activity 2.1

2.1. Describe why it is necessary to sketch freehand in good proportions and how it will assist in discussions and explanations in addition to taking and recording information.

2.2. Show by means simple sketches the following:

- The difference between the purlin and the batten
- The difference between the cornice and the skirting
- The difference between an open eave and a close eave
- The difference between a framed braced and batten door and a two panel timber door
- A section through a one brick foundation wall up to floor level.
- A simple sketch of a roof truss indicating the rafters, tie beam, struts and the king post.

Self Check

I am able to:

	YES	NO
• Describe why the ability to sketch freehand in good proportions is a skill required by the professional quantity surveyor	○	○

If you have answered 'no' to this outcome, then speak to your facilitator for guidance and further development.

Module 3 Measuring

Learning Outcomes

On the completion of this module the student must be able to:

- Describe the measuring process (taking-off)
- Describe and understand the Standard System of Measuring Building Work in South Africa
- Explain the advantages and uses of the Bills of Quantities
- Understanding the different terminologies used by the Professional Quantity Surveyor

3.1 Introduction

The measuring process involves the actual "taking-off" of the work to be done based on the architect's drawings. All descriptions shall be complete and clear and each description of an item shall be deemed to include manufacturing, conveying, and delivering, fitting and fixing in position including all waste and any other conditions as stipulated in the conditions of contract.

3.2 Provisional measurements

Most of the elements measured from the drawings or contained in the specification will be built as detailed by the architect; however there will always be items that cannot be built as drawn, viz:

- Foundations - as nobody knows the subterrein conditions, you may find rubble, rock etc below the surface.
- Plumbing and drainage - routing of the pipework, as well as the depth due to the above problems.
- Alterations and Demolitions - items that may be billed to be re-used and found unsuitable.
- Downpipes to buildings.

The above will all be measured "provisional" which in effect means it is not the final measurement-it must therefore be re-measured "as built".

3.3 The standard system of measuring builders work in South Africa [The Standard System]

The Standard System{S.S}, known as the Quantity Surveyor's "Roadmap" is the guide which is issued by the Association of South African Quantity Surveyors in conjunction with the Building Industries Federation- This book must always be available in any quantity surveyor's and building contractor's offices, and each student in quantity surveying should have a copy for easy and frequent reference.

The preface to the sixth edition states "that the first standard system for the measurement of building work in South Africa was published in 1906 by the Transvaal Society of Quantity Surveyors. Thereafter standard systems were published at irregular intervals on a national level. The sixth edition was published in 1991 with a revised issue published in 1999.

All the examples in this book are based on this latest edition. Every student should be fully acquainted with its general instructions found on pages 1 and 2.

The following clauses from the General Instructions of the SS should be adhered to at all times:

Clause 2 Setting out of bills of quantities
The bills of quantities shall be set out in the following form:
Item No Description Quantity Rate Amount

Clause 3 Order of items

The work shall be set out as far as possible in accordance with the following rules:

3.1 The work shall be divided into trades and sections of trades in the order as set out in the standard system

3.2 Within each trade or section thereof the order shall be mass, volume, area, length and number

3.3 Subject to the above rules, items shall be placed in their approximate order of value, the cheapest first.

4 Order of dimensions

Dimensions shall as far as possible be given in the following sequence:

4.1 Horizontal at right angles to the line of sight

4.2 Horizontal parallel to the line of sight

4.3 Vertical

The object of the Standard System is to:

- Provide uniformity in the preparation of a bill of quantity
- Lays down principles for measurements.
- Make bills of quantities comprehensible and adaptable.
- Provide guidelines for the measurement and is not a rigid, inflexible set of rules.
- Provides the order for the setting out of the bills of quantities.
- The simplification in the measurement of bills of quantities.
- To prevent unnecessary "padding" in the bills of quantities

The main function of the Standard System is to:

- Reduce the labour and materials reguired for a building project to common units of measurements and descriptions for the purpose of obtaining competitive tenders.
- To prevent unnecessary "padding" in bills of quantities.

3.4 Bill of Quantities

A bill of quantity is a very precise, accurate and orderly document containing all the elements of work required to construct a building, and carry into effect the intentions of the architect.

Definition: Bills of Quantities

A detail schedule setting out the quantity of each type of work in recognized units of measurements with rates for each item of work for the erection of a building

3.4.1 Advantages

- Financial control to the benefit of all parties concerned.
- Reduction of risks.
- Tenders fully competitive.
- Tenders are able to get competitive prices from their sub-contractors.

- Machinery provided for adjustments, thus reducing the causes of disputes.
- Provides contingency to cover risks which would normally have been carried by the contractor.
- Useful for future data base for an estimating guide and tool.
- Provides a service to the client, architect and the contractor.
- Allow contractors to be paid with agreed rates for the work.

3.4.2 Purpose

- It forms the basis for the preparation of the tender in the estimating process.
- Measuring tool for cost control.
- Preparation of interim valuations
- Preparation of the final account
- Pricing of variations
- Contract document- which binds the contractor to execute the work as per the rates in the bill and ensure that the client pays accordingly.

3.5 General quantity surveying terminologies

3.5.1 Interim valuations

This is the monthly valuation prepared by the PQS with the builder's contract's surveyor providing a reasonable estimate of the total value of the works satisfactorily executed.

3.5.2 Interim payment certificate

This is the certificate issued by the architect indicating the amount due and payable by the employer (client) to the contractor.

3.5.3 Contingencies

This is a lump sum included in the tender to cover for the costs of unforeseen items which may occur during the execution of the project. The full amount is deducted from the final costs and the costs for the variations added in its place.

3.5.4 Measurement nett

This is a term used by the PQS to specify that his measurement for any item excludes extras, waste and laps as per clause 5 of the General Instructions in the Standard System.

3.5.5 Purpose made and stock

Purpose made is where a particular item (door, window, etc) must be specially manufactured for the project and a stock item is a item that can be taken off a merchant's stock.

3.5.6 Extra labour and material

This is to describe for work over and above some item already allowed for.eg- extra labour and material building solid 50mm cavity in 270mm hollow wall.

3.5.7 Ditto and Do.

This is used to save repeating long descriptions in writing which is similar to the previous description.

3.5.8 Practical completion

This means the state of completion where in the opinion of the architect the works is substantially complete and ready for occupation although some minor work may still be outstanding.

3.5.9 Preambles

This is a brief specification which appear at the beginning of each trade on the workmanship and material that will be utilised- thereby reducing the lengths of descriptions used in the actual bill description of each item.

3.5.10 Prime cost amount

This is a sum of money provided in the bills of quantities for materials and goods to be obtained from a supplier nominated by the architect and to be fixed by the contractor who will add the labour and the profit to the item.

3.5.11 Provisional amounts

This refers to nominated sub-contract amounts, selected sub-contract amounts, prime cost amounts and budgetary allowances and any other monetary provisions to which must be added attendance and profit.

3.5.12 Contractor
A natural or juristic person or partnership who contracts with a client which can be either an institution or a person to perform work.

3.5.13 Final account
The document represents the final reconciliation of the total work executed and the total payment amount to be made to the contractor and accepted by all parties to the building contract.

3.5.14 South African Council of Quantity Surveying
It is the regulatory authority mandated to provide for the registration of professionals, candidates and specified categories in the quantity surveying profession.

3.5.15 Association of South African Quantity Surveyors (ASAQS)
A voluntary association which provides the profession the opportunity for the interchange and recording of the body of knowledge and experience of quantity surveyors.

Activity 3.1

1. Explain the objects of the Standard System
2. Give the functions of the Standard System
3 What are the advantages of bills of quantities
4. What are the purposes of the bills of quantities
5. Explain the difference between the Final Account and an Interim Valuation
6. Where would you find the Preambles in a Bill of Quantities

Self Check

I am able to:

	YES	NO
• State in which form the bills of quantities shall be set out	○	○
• Understand how the work in the bills of quantities shall be set out	○	○
• Book the items of the bill of quantities in a specific sequence	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 4

Professional Quantity Surveyor and Contractor's Building / Construction Surveyor

Learning Outcomes

On the completion of this module the student must be able to:

- Describe the duties of the contractor's building /construction surveyor.
- Describe the duties of the professional quantity Surveyor

4.1 Introduction

A Quantity Surveyor is a construction industry professional who specializes in estimating the value of construction works and can also be referred to as a " Cost Engineer" or " Cost Planner", although this terminology is mainly used on overseas contracts.

The term quantity surveyor derives from the role taken in quantifying the various resources that it takes to construct a given project, such as labour, supervision, plant and materials.

Quantity Surveyors use their skills to determine the cost of a building ranging from small refurbished works through to assessing the construction value of new multi-million rand road projects.

Quantity Surveyors are employed on a wide variety of projects covering all aspects of construction such as building, civils, engineering, mining, sea defence, retail and property developments.

The Quantity Surveyor's knowledge of construction costs, finances and contracts allows them to perform different tasks on a project from conception to completion and it could be divided into the following three stages.

Prior to Construction:

- Preparation of feasibility studies
- Estimating to define project budgets
- Analysis of costs effects on design changes
- Cost planning to refine the budget as the design documents develop
- Preparation of Bills of Quantities to assist in the tender process

During Construction:

- Provide cost control to the client
- Prepare the interim valuations
- Pricing of variations and delay claims
- Procurement of specialists subcontractors
- Preparing monthly forecasting and cost reporting
- Re-measurement of provisional works
- Attend client project meetings

Post Contract:

- Preparation of Final Account
- Provide expert witness in settlement of disputes
- Preparation of tax depreciation reports for investors

4.2 The professional Quantity Surveyor

He/She will either be a partner in a professional firm or will be employed in the quantity surveying profession where their main duties and services would include some of the following:

- Preparing costs estimates and feasibility studies as well as budgets for building projects,
- Preparing estimates from architect design sketches to provide costs parameters for the client and the consultants on a proposed building project.
- Preparation of bills of quantities.
- Negotiation and the preparation of tender documentation for building projects.
- Advising and assisting in the preparation of contract documentation.
- Preparing cost budgets and reporting on costs for the duration of the project.
- Preparing interim valuations as well as the final account of the building project.
- Remeasurement of all provisional measurements.
- Pricing variation orders and settling of variation accounts on building projects.
- Providing project management ,valuation and insurance claim services.

4.3 The Building/Constructor Surveyor

They will work closely with the building consultants and will in most instances be employed by construction companies, project and construction management services as well as sub-contractors in the building and allied industries, their main duties and services would include the following:

- Pricing and preparation of estimates for building projects.
- Contractual administration for building projects.
- Negotiating building contracts with clients and professional consultants.
- Preparation of tender documentation for sub-contractors and suppliers.
- Controlling and managing sub-contractors and suppliers.
- Remeasuring provisional measurements with the professional quantity surveyor.
- Negotiating and agreeing variation accounts and the settlement of final accounts.
- Preparation of interim valuation.

This "estimate of costs" by the PQS will assist the client and architect to determine the most likely budget for the complete project from inception to completion.

Once the client and the architect are satisfied that the costs will be kept within the planned budget the client will instruct the architect to proceed with the actual detailed drawings, once completed will be used by the quantity surveyor to prepare the bills of quantities.

These 'bills' will be issued by the architect to all tenderers who use it to prepare their complete tender for the project.

Activity 4.1

1. What are the duties of a professional Quantity Surveyor?
2. What are the duties of a Quantity/Building Construction surveyor?

Self Check

I am able to:

	YES	NO
• Describe the duties of the professional Quantity Surveyor	○	○
• Describe the duties of the Quantity/Building Construction Surveyor	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Notes

Module 5

Composing Bills of Quantities

Learning Outcomes

On the completion of this module the student must be able to:

- Set down dimensions on the prescribed sheets
- Book dimensions for mass, volume, area, length and number
- Understand the composition of Bills of Quantities

5.1 Introduction

A Bill of Quantities is used in tendering in the construction industry. It itemizes materials, parts and labour (and their associated costs). It should also detail the terms and conditions of the construction or repair contract and itemize all work to enable a contractor to price the work which is being proposed.

5.2 Composition of Bills of Quantities

The composition of the 'bills' will in most cases consist of the following sections:

1. Preliminaries
2. Preambles
3. Measured builders' work
4. Prime Cost and Provisional sums
5. Main summary
6. Form of tender

Although all the sections are important the section on the measured builders' work, usually constitute the main section in the bills of quantities in the majority of projects. It is also possible to have a few projects where the prime costs and provisional sums can be the main section of the 'bill'.

5.3 Processes of preparing Bills of Quantities

Generally there are two different methods of measuring, which quantity surveyor's have adopted over the years, ie

1 The London or Southern method
2 The Northern method.

The main difference between the two being, with the London method the walls are measured as if there are no openings, recesses and incidental features in it i.e: measuring overall, whereas with the Northern method each trade is taken-off by itself, and the bills can be completed without waiting for all the measurements to be finished.

The quantity surveyor's first involvement with the project will take place during the preliminary design stage when the architect request a consultant [the profession al quantity surveyor] to examine the sketch plans to ascertain the likely costs of the proposed project.

This "estimate of costs" by the PQS will assist the client and architect to determine the most likely budget for the complete project from inception to completion.

Once the client and the architect are satisfied that the costs will be kept within the planned budget the client will instruct the architect to proceed with the actual detailed drawings, which, once completed will be used by the quantity surveyor to prepare the bills of quantities.

These 'bills' will be issued by the architect or project management team to all tenderers who uses it to prepare their complete tender for the project.

Activity 5.1

Describe the difference between the Professional Quantity Surveyor and the Building Construction Surveyor (The contractors quantity surveyor)

5.3.1 :"Taking off"

The PROCESS OF PREPARING Bills of Quantities involves several definite stages, viz:

1 **"TAKING OFF'**
- the recording of the dimensions and descriptions of all labour and material items required for the work.

2 **"SQUARING and CHECKING"**
- checking for the correctness and accuracy of all sidecasts and collections.
- checking all the series of dimensions within a group which must relate to the same unit of measurement.
- Timesing, multiplying and totalling each series of dimensions.
- Checking (recalculating) all the answers and totals [this rechecking is normally done with a different colour pen and by someone other than the person who squared the dimensions.

3 **"ABSTRACTING"**
- the sorting , gathering together of identical items and transferring the dimensions onto "abstract paper" and checking the abstract.

4 **"CASTING and REDUCING"**
- "casting-up involves the totalling of the quantities in the deduct and addition columns, "reducing" referring to the rounding off of fractional quantities to whole units.

5 **"BILLING"**
– this involves transferring the reduced items from the abstracts on to 'billing' paper and writing the draft 'bill'.

The Preliminaries, Preambles, Prime Cost and Provisional Sums, Final Summary and the Tender Form will be discussed later on once the "taking-off" of the measured work has been worked through.

TYPICAL DIMENSION PAPER

A	B	C	D	E	B	C	D	E

Each of the above columns of the dimension paper have their own purpose and is used as follows:

Column A is called the "MARGIN COLUMN" or "IDENTIFICATION COLUMN" which is used for binding and where the project's name can be inserted.

Column B is called the "TIMESING COLUMN" in which the unit of multiplication is inserted if the item or group of items appear more than once.

A	B	C	D	E	B	C	D	E
	2 3	3.00 2.00		This indicates that the dimension is to be multiplied by 3 and then by 2 again				

Column C is called the "DIMENSION COLUMN" in which the measurements are set down as taken in either number, lengths, areas, and volumes all rounded off to TWO decimal places as stated in the Standard System, clause 3 under general instructions

A	B	C	D	E	B	C	D	E
		4		Indicating four in number				
		4.00		Indicating a lineal measurement of 4.00 m				
		3.00 4.00		Indicating a superficial (square) measurement 3.00 m long and 4.00 m wide				
		12.00 0.60 0.30		Indicating a cubic measurement 12.00 m long, 0.60 m wide and 0.40 m deep				

Column D is called the " SQUARING COLUMN" in which are set out the product of the calculated dimensions: eg.

A	B	C	D	E	B	C	D	E
	2 3	3.00 2.00	36	This indicates that the dimension (3x2) is multiplied by 3 and then by 2 again is equal to 36				

Column E is called the " DESCRIPTION COLUMN" in which is written the description of the work applying to a particular dimensions, ie: it is the " word picture" of the measurements- this column is also used for references, sign-postings as well as for doing all the side-casts [preliminary calculations] and collections.

A	B	C	D	E	B	C	D	E
								Irregular Figures
		20.00 2.60		1 brick wall in common bricks in 1: 4 cement mortar	½	4.00 2.00		Area of triangle Area of tria ngle with base of 4.00 m and height of 2.00 m (formula of triangle = ½(base x height)
								Perimeter of a circle
		1		44mm hollowcore commercial veneer flush door size 0.813 x 2 032 mm to steel frame		3.00		Perimeter of a circle with a diameter of 3.00 m (formula of perimeter of a circle = π diameter or πr^2

5.3.2 Colouring in of plans

- Plans are coloured in as you measure in order for details to stand out more clearly and also so that you can monitor which items have been measured already
- Yellow pens are used to run through descriptions and specifications as soon as they are incorporated into descriptions and measurements.
- No colouring is required across window and door openings

The colours normally used by quantity surveyors are:

1. Red for brickwork
2. Green for concrete and
3. Brown for wood

Activity 5.1

1. List the various sections of a bill of quantity
2. Use any dimensions to indicate the difference in booking a square dimension and a cubic dimension on the dimension sheet.

Self Check

I am able to:	YES	NO
• List two tasks in each of the three stages of the work of a professional quantity surveyor on a construction project	○	○
• I understand the different sections of a bill of quantity	○	○
• I understand how the different columns on a dimension sheet are used by the taker-off	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 6

Calculation of centerline / mean perimeter

Learning Outcomes

On completion of this module the student must be able to calculate the following:

- The centreline (mean perimeter) of a 220 brick wall and a 110 brick wall

6.1 Introduction

The perimeter is the average length of the walls, ie; the outline of a closed geometrical figure, however if that outline has thickness-as with brick walls neither the internal face nor the external face can be directly multiplied by the height to provide the area of the walls. The mean perimeter (centerline) must therefore be found. Wherever possible lengths should be found by calculation from the figured dimensions on the drawings , instead of scaling it. It is advisable to make a check to ensure that all figured dimensions are accurate.

The most common practical challenge in dealing with the line and rectangle is the above calculation of the perimeter of a building as the collection of the perimeter of walls is of great importance and is the common length that will be used for excavations, concrete footings, backfilling, risk of collapse and brickwork to most examples.

Figured dimensions may be given internally or externally and either may be used to calculate the mean perimeter of the walls.

Always calculate or adjust the dimensions given to either the external or the internal perimeter, and then make the following adjustments to a square and rectangular building:

- INTERNAL DIMENSIONS - **ADD FOUR** times the thickness of the walls, and
- EXTERNAL DIMENSIONS - **DEDUCT FOUR** times the thickness of the walls.

Worked example 6.1

In **figure 6.1** the dimensions are indicated to the inside of the of the wall thickness, in this situation the thickness of the four corners (in this case 220mm) must be added to the lengths of the walls; These calculations are called the waste calculations and are normally done in the description column of the dimension sheets.

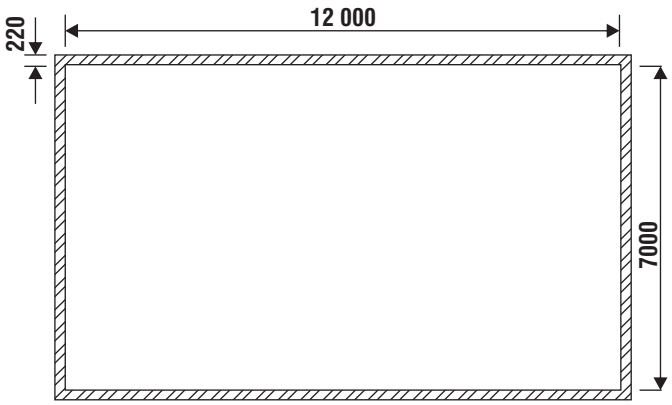


Figure 6.1

			2/12 000 = 24 000 2/7 000 = 14 000 38 000 Add 4/220 = 0,880 Centreline = 38,880

Worked example 6.2

In **figure 6.2** the dimensions are indicated to the outside of the of the wall thickness, in this situation the thickness of the four corners (in this case 220mm) must be deducted from the lengths of the walls; These calculations are called the waste calculations and are normally done in the description column of the dimension sheets.

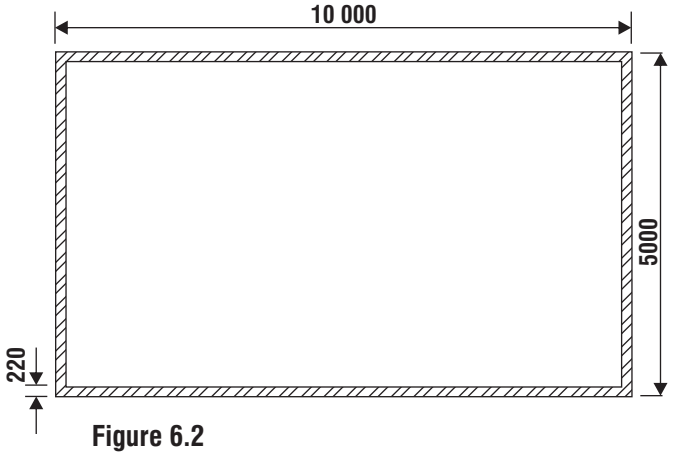


Figure 6.2

			2/10 000 = 20 000 2/5 000 = 10 000 30 000 Less 4/220 = 0,880 Centreline = 29,120

Worked example 6.3

In **figure 6.3** the dimensions are indicated to the outside of the of the wall thickness, in this situation the thickness of the four corners (in this case 220mm) must be deducted from the lengths of the walls; These calculations are called the waste calculations and are normally done in the description column of the dimension sheets.

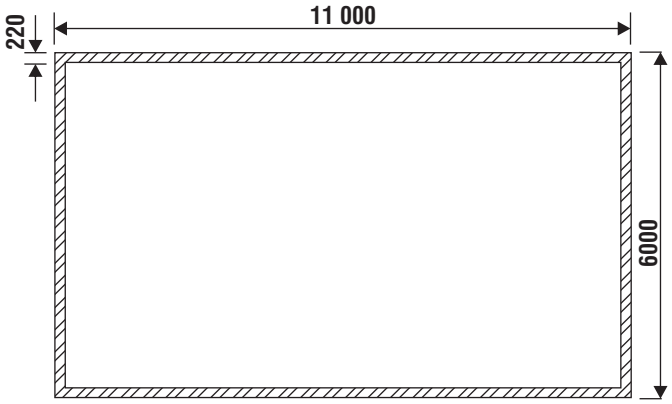


Figure 6.3

			2/11 000 = 22 000
			2/6 000 = 12 000
			34 000
			Less 4/220 = 0,880
			Centreline = 33,120

Worked example 6.4

Where the walls have breaks and recesses in it the calculation becomes a little more complicated. In **figure 6.4** the lengths of the centerlines will be calculated based on the same principles as shown in **example 6.1** to **6.3**. Dimensions are indicated to the outside of the of the wall thickness, in this situation the thickness of the four corners (in this case 220mm) must be added to the lengths of the walls. In **example 6.4** the wall breaks back in the two corners and it will be seen that the internal and external angles balance each other. If you move the above breaks and align it to the outside line of the walls the building comes back to represent a square or rectangle.

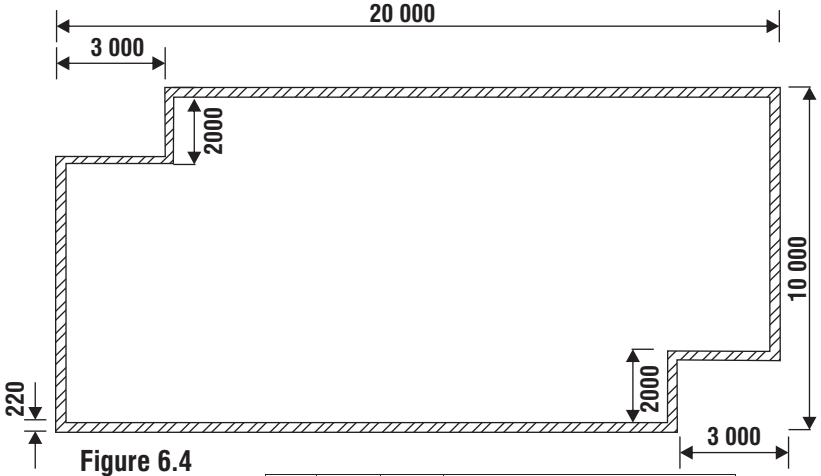


Figure 6.4

			2/20 000 = 40 000
			2/10 000 = 20 000
			60 000
			Less 4/220 = 0,880
			Centreline = 59,120

Activity 6.1

6.5.1: Use figure 6.5 and calculate the centerline of the 110 thick brickwall.
6.5.2: Use figure 6.6 and calculate the centerline of the 220 thick brick wall.

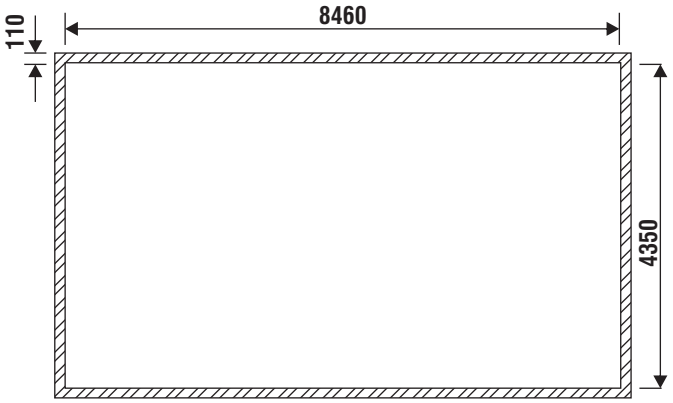
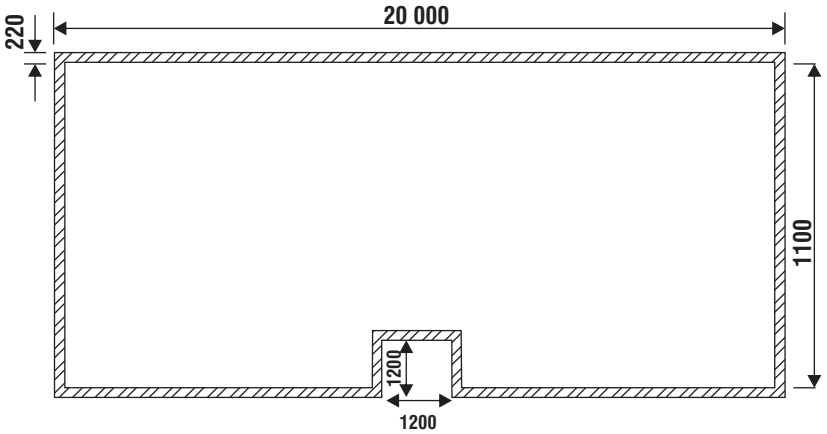


Figure 6.5



Self Check

I am able to:	YES	NO
• Calculate	○	○
o Centreline	○	○
o Mean Perimiter	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 7

Practical measurements/ Taking-off

Learning Outcomes

On the completion of this module the student must be able to:

- Prepare a measuring list for measuring a foundation
- Measure the foundations of a small dwelling.

7.1 Introduction

The following modules will deal with the general organization and procedure in taking off dimensions for the various sections of a building. It must be noted that each professional office and individual's methodology vary but the basic principle remains the same.

This book will provide you with some guidelines and you should study the Standard System in order to know all the rules which must be applied to the different elements being measured.

Before commencing with any measurement the taker-off must study the drawings in order to get his bearings and to familiarize him with the general character of the building to be measured.

The taking off of the dimensions is usually divided into two sections under two main subdivisions.

1. The Carcase and
2. The Finishings

Each of the above sections has various subdivisions as follows:

- **Carcase;**
  1. Foundations
  2. Superstructure
  3. Roofs
- **Finishings;**
  1. Internal and External Finishings
  2. Windows
  3. Doors including openings
  4. Ceilings
  5. Fittings and sundries
  6. Internal Plumbing
  7. Drainage
  8. External works

In order to assist the taker-off with the measurements of the above sections a measuring list is compiled- these measuring list will be provided as we commence measuring each section. This list is also known as the taker-off's 'shopping list'.

This list should be adhered to in order for the work to be tidy and methodical in order that no element is left out.

This book will cover the taking-off for the carcase as well as items 1 to 4 of the finishings.

7.2 Measurement of foundations

All foundations are measures provisionally and will be remeasured on completion as we do not know the underground conditions and structure. Once the foundations have been built the quantity surveyor will measure the actual measurements and the adjustment to the final quantities in the Bill will be made.

As mentioned above before commencing with the measurements a measuring list must be developed providing the taker-off with a guide as to the items to be measured.

The following is a generic measuring list for a foundation which must be adjusted according to the specification of the building.

Measuring list for a typical foundation.

- Clear site
- Excavations
- Cart away excavated material
- Risk of collapse
- Keep excavations free of water
- Concrete footings
- Brickwork
- Backfilling to trenches
- Filling or hardcore
- Surface bed
- Damp proof membrane under surface bed
- Damp proof course.
- External finishings

Figure 7.1 Illustrates a typical section through a 330 thick foundation wall identifying the different elements found in a foundation

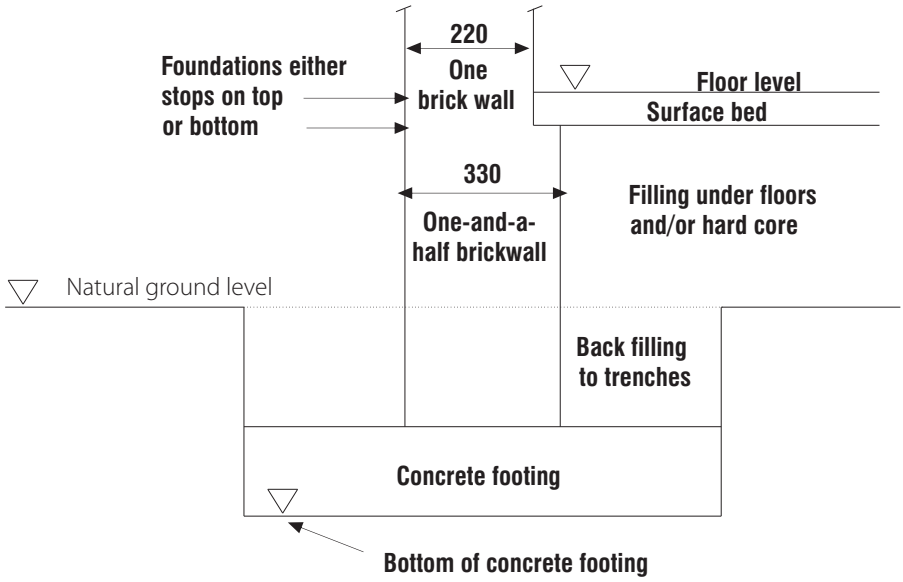


Figure 7.1

In order to commence with any measurement of foundations the following three sets of levels must be available:

1. Natural ground level
2. Bottom of concrete foundation
3. Floor level.

The natural ground level and the bottom of the concrete foundation are necessary to measure the depth of the excavation trench while the floor level are necessary to determine the correct heights of the foundation brickwork and the backfilling.

7.2.1 Commencing with the taking–off

Before commencing with the taking-off the takeoff must study the drawings carefully and adhere to the following process in the booking sequence.

- Make a cover page indicating the name of the project and other details
- Number each page and column
- Write down the name of the project either in the margin(column A) or at the top of the page-this must be done on each page or sheet
- Write down the section to be measure (Foundations , Superstructure etc)
- Draw up the measuring list from the drawing
- Calculate all the waste calculations in the description column(these are the calculations to be used in the actual booking of dimensions)
- Check all the waste calculations before starting with the actual booking of the items.
- After each item is booked /recorded on the dimension sheets ,that particular item is ticked off on the measuring list to indicate that it has been booked.

7.2.2

Worked example 7.1

The plan and section of an RDP house are shown in **figure 7.2** and in **figure 7.3.** Take off all the work for the foundation up to the underside of the surface bed based on the following specification:

Clear site: 1,500 m
Concrete: 15MPa
Bricks: Stock bricks
Filling: Clean imported filling
DPM: 250micron under surface bed

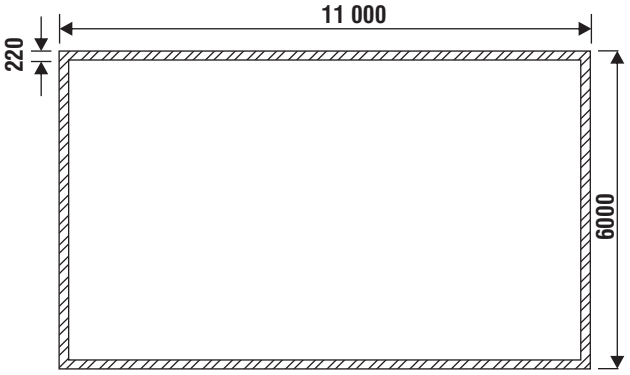


Figure 7.2

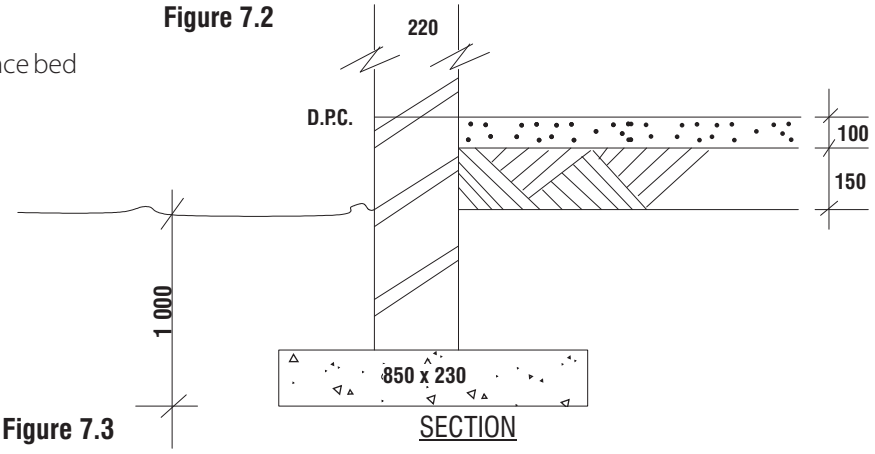


Figure 7.3 SECTION

For this example only one half of the dimension sheet will be used in order for the explanations to be inserted on the other half.

COVER PAGE

				HOUSE RDP FOR AB JACOBS ERF NUMBER 2237 LANGA SECTION: FOUNDATIONS TAKER-OFF ; ANOTHER DATE: MAY 1994 NO OF SHEETS ( )

MEASURING LIST/CHECK LIST

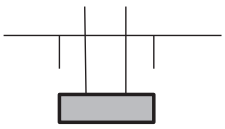
				HOUSE RDP **SECTION: FOUNDATIONS** (Heading to be inserted on sheet at top or in margin column) Collections Clear Site Excavations Concrete footings Surplus material Risk of collapse Backfilling Brickwork FOUNDATIONS (All provisional) Note: Measured up to underside of surface bed.(Stipulate till where you are measuring) 2 (Number to be inserted on each sheet)

COLLECTIONS/WASTE CALCULATIONS

To follow the same thought patterns it is advisable to complete all the waste collections at the beginning although some professionals prefer to do the waste calculations as the item is being measure. There are no hard and fast rules as to how you need to do the waste calculations as long as you record it and it can be checked. For the measurement of the foundations the Earthworks section in the Standard System must be referred to.

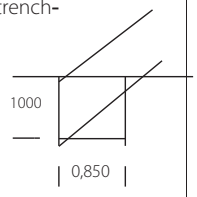
In taking off it is customary to make use of abbreviations instead of writing out the full description. We will make use of full descriptions for the first example and then all other examples common abbreviations will be used as per the list in the appendix .

				Site Clearance Where new buildings are to be erected it is advisable to measure stripping the vegetable soil and the site clearance. In this example we will only measure the site clearance. Normally the complete building plot will be cleared of all trees, debris and vegetation. We will only measure the site clearance as per the specification above, which is 1,5 m around the external face of the building. Waste calculations for clear site: L = 11 000 W= 6 000 Clear site 2/1 500 = 3 000 3 000 Add to L and W **14 000** **9 000** **14 000 and 9 000 dimensions to be booked as a square dimension** 3

				Waste Calculations (Cont) Centreline calculation 2/11 000 = 22 000 2/6 000 = 12 000 34 000 less 4/0,220 = **33 120** Excavation Depth (measure from ground level) Given as : **1 000** Backfilling to sides of excavation: Height : 1 000 less 0,230 = **0,770** Width of footing less thickness of brickwork divide by 2 0, 850 0, 220 = 0, 630/2 = **0,315** for each side GL  Fill under surface bed: Given as **0,150** Brickwork height(note to underside of surface bed) Excavation depth less concrete footing **+** thickness of fill 1000 Less 0,230 0,770 0,150 **0,920** 4

Please note that normally both the set of columns on the dimension sheets will be used to book the items but we will be using the one column to provide explanations as we book the items. The totals in **bold** print above will be the dimensions to be booked on the dimension sheets.

								NOTES
		14,00 9,00		Clear site of all rubbish, debris, and vegetation and leave site ready to be built on				Measured in square meters as Clause 4 of the SS
		33,12 0,85 1,00		Excavate in pickable material for surface trenches not exceeding 2 m deep from ground level and get out.				State the type and nature of material(pickable material)clause 5 &7;Successive depths of 2 m and in cubic meters (clause 6)
		33,12 0,85 0,23		15 MPa concrete in foundation footings & Extra over excavations for carting away surplus material				Measured in cubic meters (clause1 under Concrete Section) As the earth being removed is the same volume as the concrete we can bracket the two descriptions using the same dimension as shown
				5				

	2	33,12 1,00		Allow for risk of collapse to sides of trenches not exceeding 1,5 m deep				NOTES Measured in square meters as Clause 10 of the SS-measured to the two vertical sides of excavation trench- 
		Item		Keeping excavations free of water				Clause 12
	2	33.12 0,32 0,77		Backfilling to trenches & Ddt Extra over carting away surplus excavation material				Measured in cubic meters see clause 14 The volume of excavated material to be removed from the site will be the same as the backfilling
				6				

								NOTES
		33.12 0,92		One brick wall in stock bricks in 1:3 cement mortar				Refer to clause 1 to 6 under masonry, clause 6 states that the unit of measurement for walls shall be square meters.
				Note: End of foundation				It is advisable to note that this is the end of the measurement. All items booked must now be ticked off on the measuring list to indicate that all have been measured.
				7				

7.2.3 Measurements

We will now measure the surface bed, face bricks, filling under slab and the DPM with the next example of the foundation.

Example 7.2:- The plan and section of an RDP house are shown in **Figure 7.2** and in **Figure 7.3**. Take off all the work for the foundation up to and including the surface bed based on the following specification:

Clear site: 1,500 m
Concrete: 15MPa
Bricks: Stock bricks
Filling: Clean imported filling
DPM: 250micron under surface bed
Facings: Two courses below ground level.

Some of the same dimensions used in **example 7.1** will be used in **example 7.2** and the following new items must be calculated in the waste collections;

- New brick height to include the surface bed
- DPM area
- Filling area
- Height of facings
- Perimeter of face walls

Note: The cover page as in **example 7.1**

HOUSE RDP

FOR AB Williams

ERF NUMBER 2237

LANGA

SECTION: FOUNDATIONS

TAKER-OFF ; ANOTHER

DATE: MAY 1994

NO OF SHEETS ( )

(1)

Waste Calculations

Centreline calculation as example 7.1 = **33.120**

External length of facings

2/11 000 = 22000
2/6 000 = 12 000
34 000 external length of facings(perimeter)

Excavation Depth as in example 7.1 : **1 000**

Backfilling to sides of excavation: as example 7.1

Height : = **0,770**
Width: = **0,315** for each side

Fill under surface bed: Given = **0,150**

Area of Fill under surface bed (this will also be the area for the DPM

We need to calculate the inside dimensions of the building:

		11,000	6,000
Less 2/0,220	=	0,440	0,440
Inside dimensions	=	**10,560**	**5,560**

(2)

Brickwork height(now to top of surface bed)
Excavation depth less concrete footing + thickness of fill

	1000
Less	0,230
	0,770
	0,150
	0,920
Add Surface bed	0,100
	1,020

Height of facings:

The height of the facings will be determined by the specifications, in most cases it will be 2 courses below the natural ground level to allow for any soil erosion which could happen afterwards.

The perimeter of the building will be taken on the external wall face and the height as per above.

Base of figure 7.3 the facing height will be calculated as the following, :

NB: for all practical reasons one course is taken as 75mm high therefore 2 courses will be
2 x 75mm = 150

Surface bed:	= 100
Filling under floor:	= 150
2 courses below ground level:	= 150
Height of facing course thus :	**0,400**

(3)

14,00 9,00	C.S		NOTES The use of abbreviations are customary in any quantity surveyor's office and the contractions of words are very commonly made by the omissions of several letters with their meaning being obvious from the context of the description. A full list of abbreviations commonly used will be found in the appendix.
33,12 0,85 1,00	Exc. in p. matl. for s.t. n.e 2m dp. g.o.		
33,12 0,85 0,23	15 MPa. conc. in fnds. Ftgs. & Ex.o. exc. for c.a. surp. Matl.		
2 / 33.12 1,00	R.o.c		
Item	F.o. W.		
2 / 33.12 0,32 0,77	B.fill to t. & Ddt. Ex.o. c.a. surp.matl		

(4)

		10,56 5,56 0,15		Imported clean sand filling spread and level under surface bed				NOTES Measured in cubic meters as Clause 14 of the SS. Measure the net volume as the bulking factor will be allowed by the estimator.
		33,12 1,02		1B . wl. in stock bks in 1: 3 c.m.				
		34,00 0,40		Extra over ordinary brickwork for facings in Corobrick rustic in 1:3 c.m in stretcher bond including pointing and jointing.				Measured in square meters (clause 25 under Masonry Section).The type of facing brick must be stated as well.
		10,56 5,56		Damp proof membrane 250micron laid on sand filling(elsewhere measured)				Clause 1 & 2 in the Waterproofing trade.
				End of example 7.2				
				(5)				

Activity 7.1

Refer to the plan of **figure 6.1** and the section through the foundation as shown in figure 7.4 measure the foundation up to and including the surface bed using the following specification:

Specification:

Clear site : 2 000 m
Concrete : 15MPa
Brickwork: Stock Bricks in 1:4 Cement mortar
Facings : 2 courses below ground level
Filling under surface bed: imported clean sand fill
Damp proof membrane: 250 micron

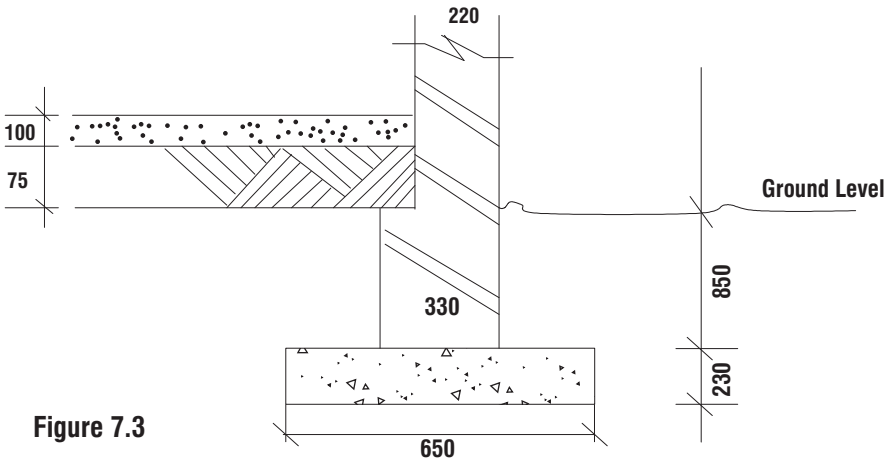


Figure 7.3

SECTION

Self Check

I am able to:	YES	NO
• Prepare a measuring list for measuring a foundation.	○	○
• Calculate the measurement of the foundation.	○	○
• Book the descriptions for a foundation.	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 8

Measurement of the Superstructure

Learning Outcomes

On the completion of this module the student must be able to:

- Compile a measuring list for the measurement of the superstructure
- Measure the superstructure elements including the finishings.

8.1 Introduction

In working through the superstructure we will be measuring the work in three elements:

1. The actual brickwork
2. The internal finishings
3. The external finishings

This consists of all brickwork from a fixed position, depending where the foundations were measured up to: It could be from any of the following levels:

- Top of surface bed; or
- Bottom of surface bed.

It is important that you indicate this level. For example:

- Superstructure brickwork measured from top of surface bed level.

Masonry work shall be classified according to the material and quality of the masonry unit, the bond and the composition of the mortar – separate items shall be given for different elements, such as walls, piers.

For this module the following sections in the Standard System must be studied:

- Masonry, clauses 1 to 33
- Carpentry and Joinery, clause 8
- Plastering, clauses 1 to 3
- Paintwork, clause 1 to 3

In the measurement of walls the area is booked in the dimension column and is described in the description column in terms of thickness.

For example:	110 mm thick wall	=	Half brick walls
	220 mm thick wall	=	One brick walls
	330 mm thick wall	=	One and half brick walls
	440 mm thick wall	=	Two brick walls

Where brick footing course occur it shall be billed in cubic meters.

Cavity or hollow walls are measured in the same way and described in the description column in terms of thickness.

For example: 270mm hollow walls of two half brick skins, including wire ties – See clause 6.

Internal walls – it is best to measure internal walls immediately following the measurement of the external walls for each item. An adjustment must be made at the intersection of the two walls. The complete section on internal walls will be covered in the N5 book.

Facebrick

Remember when measuring facings that the thickness of the brickwork is immaterial, the face bricks will only be the outside skin of the wall. (Except on garden walls faced both sides).

Whether the wall is 330mm thick 220mm thick, and so on, it does not affect the extra cost of facings.

However, the bond and kind of pointing do affect it, as the number of facing bricks required for one square metre will vary with the bond and the pointing can vary in two ways – the materials and the method (labour).

All openings, recesses and so on, will be disregarded. Initially (the southern or London method of measurements). As the heights of the walls will vary, we need to measure up to the same general line or height – in this example the superstructure will be measured up to the bottom of the wall plate level.

The gables, beam filling and other sundry items will be measured when we take-off the roof. It is often more convenient to measure these items with the roof.

This module will cover the following:

- Superstructure brickwork;
- Finishes;

Worked example 8.1

Figure 8.1 and **8.2** shows a plan and section of a dwelling.
Measure the superstructure of all work including the internal and external finishes from the surface bed upwards to the underside of the wall plate.

Specification

Brick wall: Stock bricks in 1:3 cement mortar
Finishes: Plaster internal and external
Paint. Two coats PVA internal and external with and including filler coat.
Skirting. 19 x 70mm meranti with two coats varnish.

The measurement of the brickwork in the top structure will be either from top of the surface bed or bottom of surface bed as per the specification.

Also for dwellings the height of the brickwork will be taken as to the underside of the wall plate level.

The doors and openings will initially be disregarded as it will be measured on its own later on in module 10.

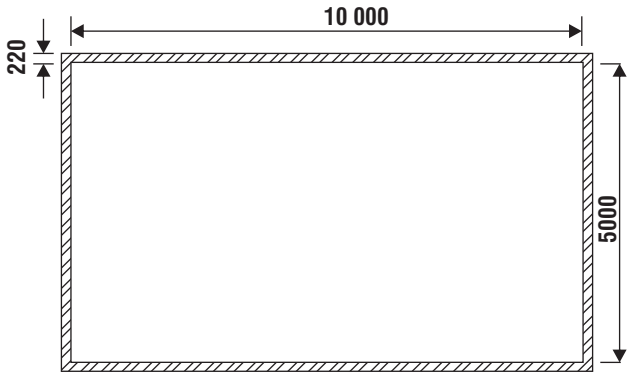


Figure 8.1

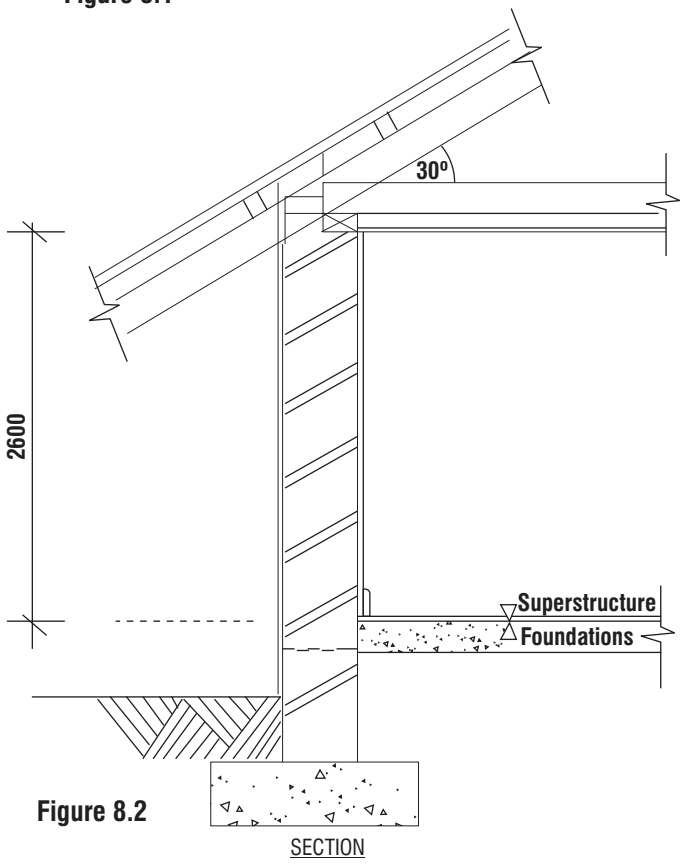


Figure 8.2

SECTION

Example 8.1

HOUSE RDP

FOR AB JACOBS

ERF NUMBER 2237

LANGA

SECTION: SUPERSTRUCTURE

TAKER-OFF ; ANOTHER

DATE: MAY 1994

NO OF SHEETS ( )

Measuring List:

All work above floor level:
Brickwork
External Finish
Plaster
Paint
Internal finish
Plaster
Paint
Skirting

Collections:

Centreline of 220 wall:

2/10 000=	20 000
2/5 000 =	10 000
	30 000
Less 4/220=	0, 880
	29 120

External perimeter of wall for plaster length:
= **30 000**

Internal perimeter lengths of walls:

	10 000	5 000
Less 2/220=	0,440	0,440
	9,560	4,560

Length of inside walls = 2/9,560 + 2/4,560 = **28,240**

②

							NOTES
			Brickwork				Height of wall as given in section as 2,60 from top of surface bed to underside of wall plate.
	29,12 2,60		1B . wl. in stock bks in 1: 3 c.m.				
			External Finishings				
	30,00 2,60		External Combo plaster on brickwork.				Measured in square meters (clause 1 to 3 Plastering).State if plaster to brick or concrete as it entails different preparation work.
			&				
			One coat sealer and two coats exterior quality PVA emulsion paint on plaster surfaces				Paint square area same as for plaster therefore we make use of the bracketing system where two different descriptions uses the same dimension
			③				

			Internal Finishings				NOTES
	28,24 2,60		Internal combo plaster on brickwork				
	28,24 2,53		One coat sealer and two coats interior quality PVA emulsion paint on plaster surfaces				Note that internal paint height different to plaster as adjustment must be made for the skirting (70 mm) 2,600 Less 0.070 **2,530** Always take bracket to end of collections for that item
	28,12		19 x 70 mm wrot meranti skirting plugged				Measured in lineal meters see clause 8 under Carpentry and joinery
			&				.
			Two coats varnish on meranti skirtings n.e 300 mm girth				Paintwork not exceeding 300 mm see clause 3 under paintwork
			End of example 8.1				Same dimension two descriptions Similar to above and can be bracketted
			④				

Worked example 8.2

Figure 8.3 shows a plan of a mountain hut:
Use the following specification and measure the following:

The superstructure brickwork from top of surface bed
External finishes
Internal finishes
Screed

Specification;
Floor to wall plate height is 2.400
External finshings – facings
Internal finishings – plaster and 2coats PVA
20mm grano floor
70mm grano skirting

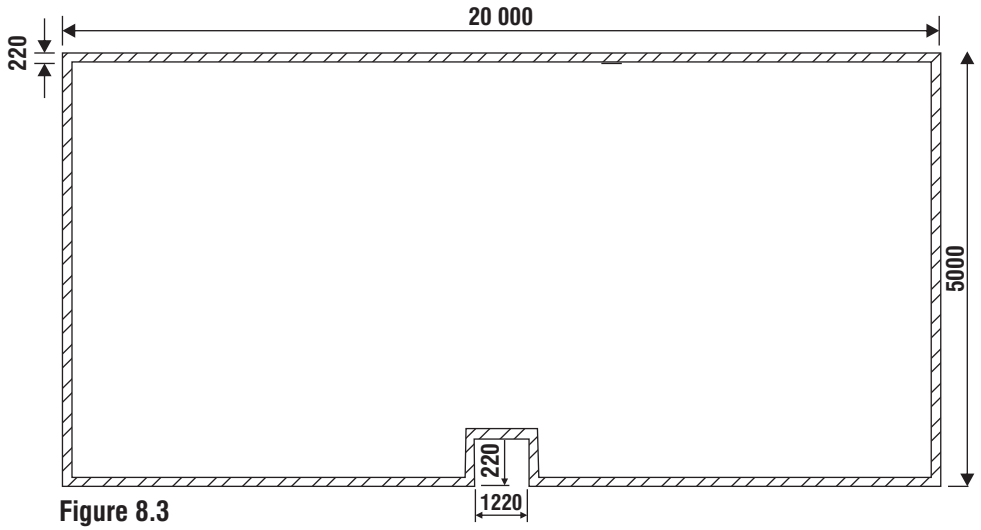


Figure 8.3

Example 8.2

				HOUSE RDP
				FOR AB BOOI
				ERF NUMBER 2237
				KLERKSDORP
				SECTION: SUPERSTRUCTURE
				TAKER-OFF ; ANOTHER
				DATE: MAY 1994
				NO OF SHEETS ( )

				Measuring List: All work above floor level: Brickwork External Finish Plaster Paint Internal finish Plaster Paint Skirting Collections: Centreline of 220 wall: 2/20 000 = 40 000 2/11 000 = 22 000 62 000 Add 2/12 00 2 400 **NB: Recess of walls 2 x 1.200** 64 400 ***Less 4/220 0,880*** 63 520 External perimeter of wall for plaster length: = 64 400 +2/1.200 **= 66.800** Internal perimeter lengths of walls: 20 000 11 000 Less 2/220= 0,440 0,440 19,560 10,560 Length of inside walls = 2/19,560 + 2/10,560 = 60.240 +2/1.200 = **62.640** ②				

	63.52 2,40		Brickwork 1B . wl. in stock bks in 1: 3 c.m.				NOTES Height of wall as given in section as 2,40 from top of surface bed to underside of wall plate.
	66,80 2,40		External Finishings Extra over ordinary brickwork for facings in rockface face bricks including jointing and pointing in 1;4 cement mortar ③				.

			Internal Finishings				NOTES
	62.64 2.40		Internal combo plaster on brickwork				Note that internal paint height different to plaster as adjustment must be made for the grano skirting (70 mm) 2,400 Less 0.070 **2,330**
	62.64 2,33		One coat sealer and two coats interior quality PVA emulsion paint on plaster surfaces				Always take bracket to end of collections for that item
	62.64		Untinted granolithic skirting 70 mm high				Measured in lineal meters see clause 5 under Plastering .
			End of example 8.1 ④				

Activity 8.1

Figure 8.4 and **Figure 8.5** shows the section and plan of a dwelling.

1.1 Measure the superstructure from the bottom of the surface bed
1.2 Measure the internal finshings
1.3 Measure the external finishings
1.4 Measure the concrete floor and the floor finish
1.5 Measure the skirting and the varnish on it

Specifications;

- Brickwork to be stock bricks in 1: 4 cement mortar
- External finishings to be facings in Autumn Hue Rockface face bricks
- Internal finishings to be plastered with one coat plaster primer and two coats PVA
- Surface bed to be 15 MPa concrete
- 20mm grano floor
- Skirting to be 70 x 20 mm meranti with two coats varnish

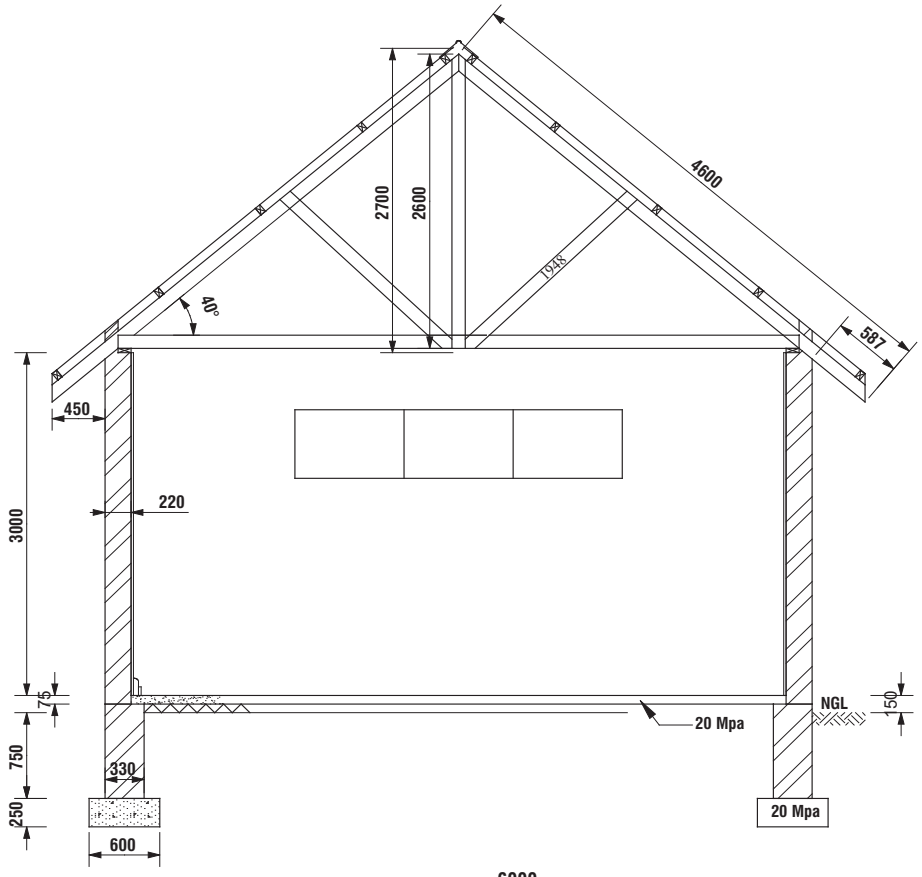


Figure 8.4

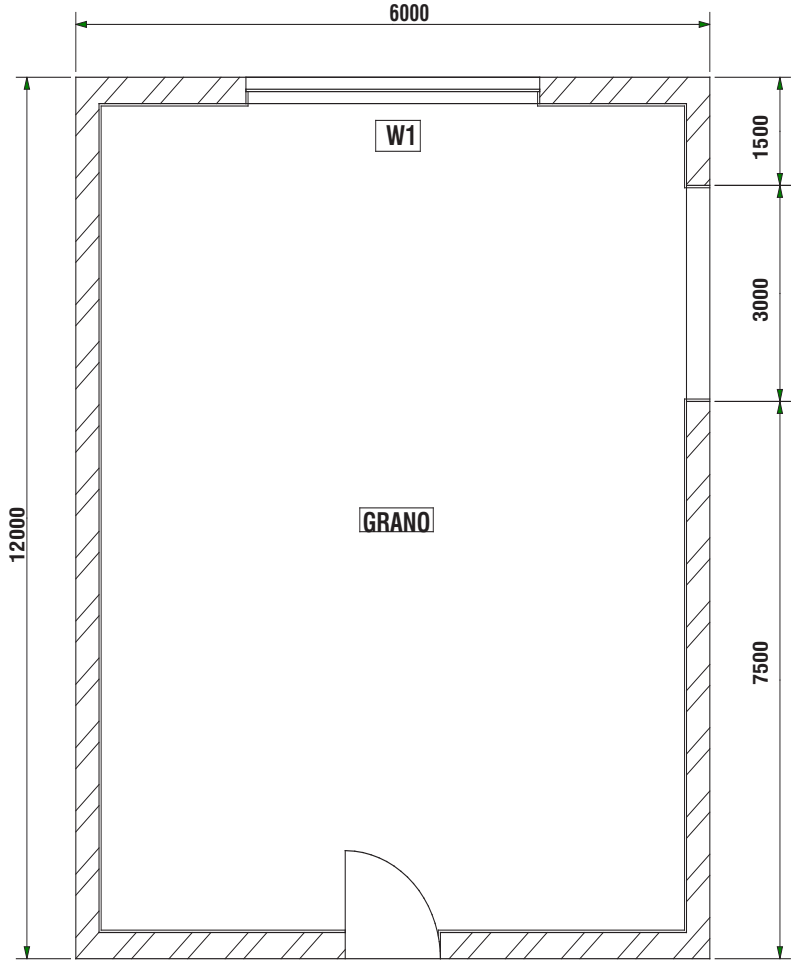


Figure 8.5

Self Check

I am able to:	YES	NO
• Compile a measuring list for the measurement of the superstructure	○	○
• Measure the superstructure elements including the finishings	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 9

Measurement of Roofs

Learning Outcomes

On the completion of this module the student must be able to:

- Prepare the measuring list for a roof
- Measure the gable brickwork
- Measure all the items for the roof
- Measure the items for roof covering
- Measure the rainwater items

9.1 Introduction

The measurement of roofs as for the superstructure of a building subdivides itself into the coverings and the construction. The rainwater goods are usually measured under the roof section

The measurement of the covering which will be the actual square area of the roof to be covered. Special care should be taken with regard to the different types of roof coverings.

Measurement of the construction may begin with the wall plates, trusses, purlins and fascias and barge boards.

When studying or measuring roofs particular attention must be given to the following clauses in the standard system under the following headings:

Masonry	Clauses 7, 28 and 63
Waterproofing	Clauses 1, 2, 6 and 7
Roof coverings	Clauses 1 to 22
Carpentry and Joinery	Clauses 1 to 6
Ceilings	Clause 1
Plumbing and Drainage	Clauses 2 and 3
Paintwork	Clauses 1, 2, 3 and 5

From the above it can be seen that the measurements of roofs transcends different trades. By now you should have a good understanding of the standard system in order to utilise its guidelines effectively.

We will provide examples of two different types of roof coverings; a fibre cement sheet covering and a tile covering.

With the first example we will utilise only the left hand column in order to have the right hand column for remarks and sketches.

The measurement of roofs are subdivided into 3 distinct elements viz:

- Covering
- Construction
- Rainwater goods

Different coverings must be measured separately. We will only consider the roof covering with pitches not exceeding 25 degrees. When however the pitch exceeds 25degrees the actual pitch must be stated. See **Clause 1** of Roof Coverings.

Battens, underlays and fixing accessories shall be included in the description for the roof coverings for tiles, slates, etc. With corrugated, IBR and fibre cement sheeting, purlins must be measured separately. See **Clause 1** of Roof Coverings and **Clause 4** of Carpentry and Joinery.

The number of rafters or trusses will be calculated by taking the total length of the roof between the end walls (gable walls), dividing it by the centre to centre spacings of the trusses or rafters and adding one additional truss to allow for a truss or rafter at each end.Wrought ends of timbers shall be given in number and painted if so required. Wall plates must be secured to the top of the wall, either with bolts or with galvanized hoop iron, similarly anchor bolts or hoop iron must be measured to tie the feet of roof trusses or rafters of the building.

It is important to state the method of fixing the truss elements together, by means of nails, bolts, etc. and to book the structural timbers in the length categories as stated in clause 4, e.g. 40 110 mm sawn South African pine bolted roof truss members in lengths, not exceeding 2,40 metres. This method of booking is only applicable to trusses manufactured on site.

However when we measure a plate nailed timber roof truss, the roof trusses shall be measured in number with the purlins and bracing given separately.

These plate nailed trusses (or as commonly known, gang nailed), may also be given as an item which includes purlins, bracings, etc. See **Clause 5**.

Worked example 8.1

Refer to **figure 8.4** and **8.5** and measure all work from the underside of the wall plate upwards.

Use the following specification:
Walls – Face brick
Scope of Roof 30
Bolted trusses, S.S.A.P. at 1,20 metres maximum centres.
Rafters and tie beam 38 x 114mm.
Purlins 50 x 76 mm.
Covering – Fibre cement sheets with standard ridge capping
– 30 x 200mm wrot SSAP fascia
– 30 x 200mm wrot SSAP barge board
Overhang at gables 200mm
Rainwater goods
– 125mm PVC gutters and 80 mm diameter PVC downpipes
– 900 x 300 x 150 mm half round precast channel
Paintwork required to all exposed timber surfaces
Roof tie = 30 x 1,6mm galvanised hoop iron 1,50metres long.
Roof insulation to be sisalation 420

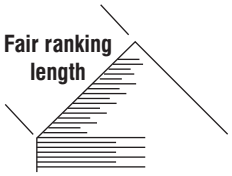
COVER PAGE

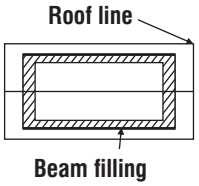
				HOUSE FOR AB COZA ERF NUMBER 345 HANOVER PARK SECTION: ROOF TAKER-OFF ; ANOTHER DATE: MAY 1994 NO OF SHEETS ( )

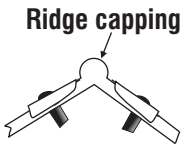
MEASURING LIST/CHECK LIST

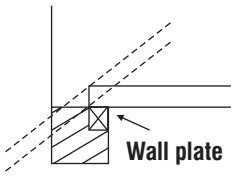
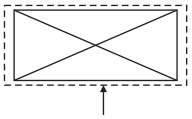
				HOUSE COZA SECTION: ROOF (Heading to be inserted on sheet at top or in margin column) Measuring list/Check list Collections Gable Walls Beam filling Coverings Wall plate Trusses Fascias and Barge boards Rain water goods Note: Measured from underside of wall plate . (Stipulate from l where you are measuring) (2) (Number to be inserted on each sheet)

Example 9.1

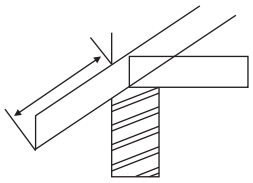
				BRICKWORK **GABLE BRICK WALLS**				**NOTES** As the brickwork in superstructure was measured previously we will only measure the gable brickwork with this example
	2 ½	6.00		1B WL in stock Bks in 1:4 c.m a.b.				All dimensions taken will be those that have been taken off the scale drawing of the roof truss. Figure 8.4 and 8.5
	2	2.40 6.00 0.20		and E.O.O.B. for facings a.b.				In practice an architect engineer's drawing should be used to scale the dimensions Area of triangle = ½ base x height= Base = 6.000 and height is 2.600 less 200mm for beam filling = 2.400 Brickwork and facings measure already so only use abbreviations a.b.
	2 2	4.60		Fair raking cutting and waste on face bricks				This is the measurement for the raking (sloping ends of the gable brickwork (2 gables and 4 lengths) 
				③				

	2 / 11,56			Half brick wall in beam filling built in face bricks including cut and fit around timbers Super x 0,200 = M2				**NOTES** Calculation for beam filling 12,000 less 2/0,220 = **11,560** Beam filling measured between gable walls. 
				ROOF COVERINGS				Length of roof
	2 / 12,40 4,60			Fibre cement Big six roof Sheeting with pitch of 40 degrees fixed to purlins to manufacturer's instructions. and sisalation 420 insulation laid over purlins including galvanised steel straining wires. (4)				Length of building= 12 000 Add overhand at verges 2/200 = 0,400 **12,400** Width of roof = same as rafter length **N.B**. Measure Sisalation / roof underlay only if specified

				Roof Sundry Items				**NOTES**
				Ridge capping Finials				
	12,40			Close fitting adjustable ridge capping				Ridge capping normally the same length as the roof covering
	2 / 2			Ridge Finial (5)				Measure in number one to each end of the sheet profile to close the ends (acts as a ridge bird proofing)

	2 / 11,56			**CARPENTRY AND JOINERY** 38 × 114 mm S.S.A.P. wall plate and 2) Cabolinium on Gen wood surfaces. Super 0,30 = m² 2/38 = 0,076 2/114 = 0,228 0,304 (6)				**NOTES** This is in most cases the same length as the beam filling. Length of wall less thickness of gable wall ends 12,000 less 2/,220 = **11,560**  This is the preservative against moisture 

				Roof Trusses The following in no 11 similar SSAP nailed roof trusses (The following x 11)				**NOTES** **This heading is used to prevent the repetition of the Words SSAP nailed roof trusses** Calculation for number of trusses: Inside dimension of walls divide by the centres (in this case 1,200) 11,560/1,200= 9,63 say 10 +1 = **11 number** trusses All structural timbers booked according to the length categories clause 4; Length of tie beam 6,000 less 2/110 ==**5.78** Length of rafters Dimension given on drawing Where similar descriptions are used the abbreviation "ditto" or "Do" may be used
	5.78 2 / 4.60			38 x 114mm structural timber in trusses bolted together in lengths exceeding 3,9 and not exceeding 6,6m long - Tiebeam (reference notes) - rafters				
	2,60			Ditto, exceeding 2, 4 and not exceeding 3,9m long - Post				
	2 / 1,95			Ditto, not exceeding 2,40m long - struts (7)				

		8		10mm diameter bolts 100 mm long x 0,10 kg = kg				**NOTES**
		2		30 x 1,6mm Galvanised hoop iron roof tie 1,5m long				The roof tie to anchor the rafter feet to the wall normally built six courses into the 
		2		End of 38 x 114mm rafter wrot for a length of 0,587mm				
	2 /	0,59 0,30		Knot, prime, stop and one coat wood primer and two coats oil paint to general surfaces of woodwork at eaves				Girth of rafter for paint 2/114 = 228 2/38 = 76 **0,304**
				END OF X 11NUMBER				
	2/4 /	12,40		50 x 76mm SSAP purlins				As this is not structural timber it is measured in lineal meters
	2 /	12,40		76 x 76 do but splayed and wrot eaves purlin				Four purlins per side x two sides Purlin at open eaves against the fascia board
				(8)				

				Fascias and Barge boards				
	2	6.40		30 x 200mm wrot South African Pine fascia planted on including miters, stops etc. & Knot, prime, stop one coat wood primer and two coats oil paint to general surfaces of woodwork at eaves Super x 0,460 = ____ m^2 2/200=400 2/0,30=60 == **0,460**				We may insert the wording super x……. to indicate that the measurement must be squared by the dimension.
	2/2	4,60		30 x 200 Ditto barge board ditto at verges. & Knot, prime, stop, one coat wood primer and two coats oil paint to general wood surfaces at eaves Super x 0,460 = ____ m^2				
				(9)				
				RAINWATER GOODS				**NOTES**
	2	12,40		120mm half round PVC eaves gutter fixed to fascia				Eaves gutters will always be the same length as the fascia
	2	2		Extra over ditto for stop ends				One measure at end of the gutters
	2/2	2		Extra over ditto for 80mm outlet				Good practice to allow slope for a length of 6 meters only, in this case the length is 12,40 so we have two sets of downpipes per gutter
	2/2	3,00		80mm diameter PVC rainwater pipe fixed to wall (provisional) Take Length same as floor to ceiling height				Downpipes will be remeasured after installation as the height of the plinth brickwork will be unknown
				(10)				

	2/2	1		RAINWATER GOODS Extra on ditto for shoe and Ditto for offset (swan neck) and Standard precast storm water channel 300 mm wide X 150 mm deep X 900mm long bedded in concrete END OF ROOF (11)				**NOTES**

Activity 9.1

Refer to figure 9.1 and measure the following items only:

Hint: the roof plan indicates the total length of the roof.

9.1 The roof covering
9.2 Trusses

Specification:

- Nailed SSAP Roof Trusses at 600 mm centres
- 420 x 332 mm concrete roof tiles
- 250 micron roof underlay
- 38 x 38 mm battens at 345 mm centres
- 230 mm PVC Fascia
- 230 x 70 mm PVC Barge Board
- Rafter length= 6,590 m
- post length = 2.720
- strut length = 2,72

Refer to the following clauses in the **SS**

Clause 1 of Roof Coverings
Clause 4 of Carpentry and Joinery

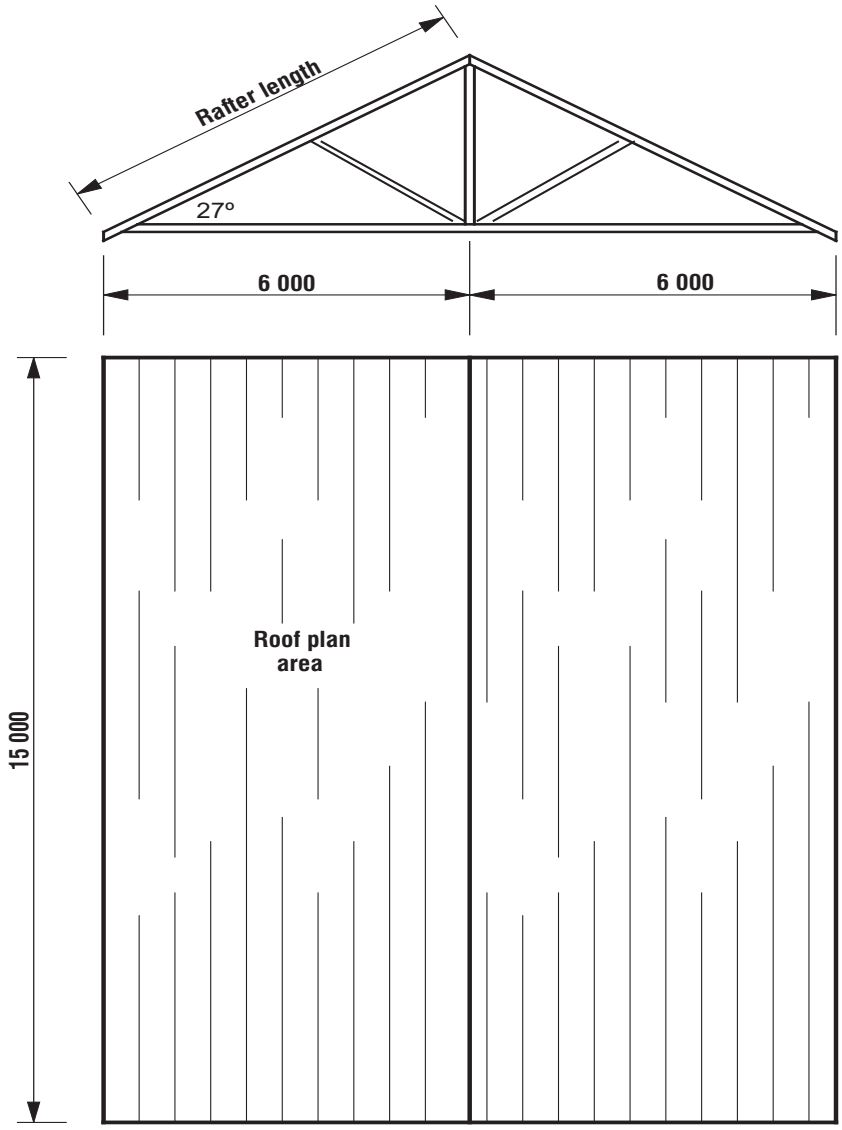


Figure 9.1

Self Check

I am able to:	YES	NO
• Prepare a measuring list for measuring a roof.	○	○
• Measure all the elements for measuring the roof.	○	○
• Measure the rainwater goods	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Module 10

Measurement of Plain Openings

Learning Outcomes

On the completion of this module the student must be able to:

- Compile a measuring list for the measurement of a plain opening
- Measure the Plain Opening including the finishings.

10.1 Introduction

Plain openings are measured as for internal doors – only no frame and lining required.

Allow with plain openings a turning piece to support the flat arch.

The turning shall be measured in lineal metres stating the width of the supporting wall.

Note: To all doors, adjustments must be made for floor finishing at threshold, for example:

- Concrete infill
- Cement screed
- Carpet and vinyl
- Skirting (external wall one side only and internal wall both sides)
- Add skirting into reveals of door openings.

As with all the previous measurements we begin with the collecting of the shopping list (Measuring Lists).

Measuring list for Plain Opening

Adjustments:

Ddt - Brickwork
- External finishings
- Internal finishings
- Skirtings
- Paint on skirtings

Add - Reveals
Lintol, Beam or brick reinforcing wire (depending on the detail)

Add Threshold
- Concrete in surface bed
- Screed
- Floor finish
- Formwork

Add Step
- Concrete to step
- Formwork
- Plaster or grano

Worked example 10.1

Measure the adjustment required for the plain opening size 3 000m wide x 2.100m high as shown in **Figure 10.1** and **Figure 10.2**.

Specification

Walls – External facings
– Internal plaster and two coats P.V.A.
– 19 x 76mm meranti skirtings
– varnish on skirtings

SLAB – 100mm surface bed
– 30mm untinted granolithic

Lintol – Brick-on-edge
– Brick reinforcement

Reveals – finish on reveals the same as external finish

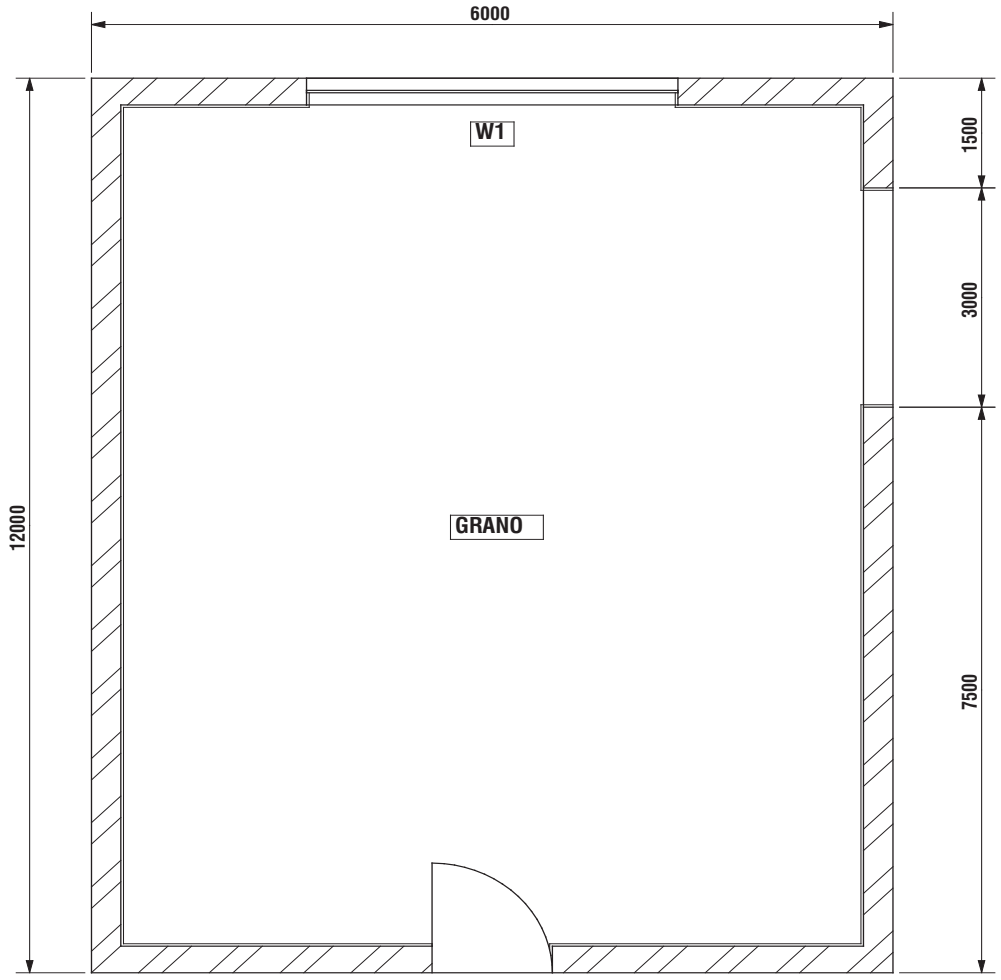
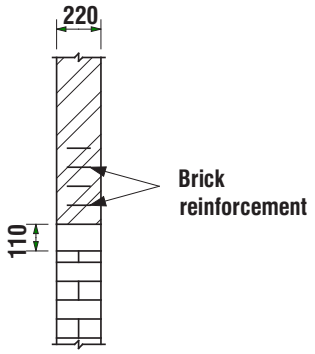
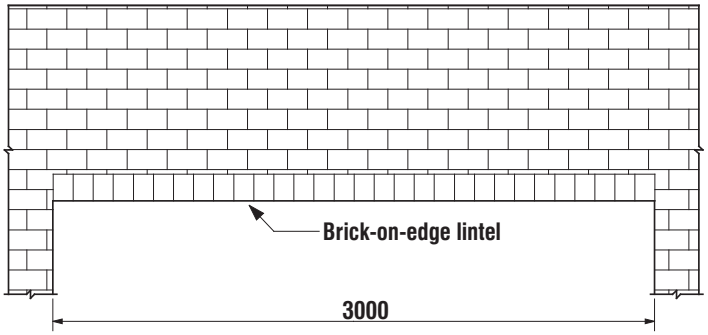


Figure 10.1

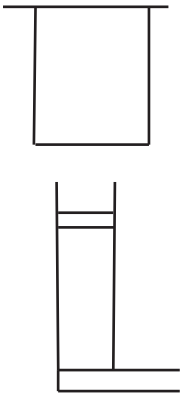


VERTICAL CUT THROUGH LINTEL

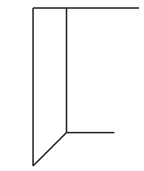
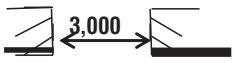


FRONT VIEW

Example 10.1

		PLAIN OPENING					**NOTES**
		Adjustment **Ddt** • Bwk • Ext Finish • Int Finish • Skirting • Paint on Skirting Add • Reveals • Lintol • Bwk at Lintol • Threshold					Previously the walls, floors, finishings were all measured with the superstructure, with the adjustments we now have to remove these measurements to allow for the area to be covered by the opening. 
	3,00 2,20	**Ddt** 1Bk wl a.b. & **Ddt** e.o.o.b for fcgs a.b					Height of opening to be deducted: Height of opening + the thickness of the surface bed. 9.1 + 0,100 = **2.200**
		①					

				PLAIN OPENING (CONT)				**NOTES**
				Ddt				Now we must deduct the measurement for the internal finish: The plaster, paint on plaster, skirting and varnish on skirtings
		3,00 2,10		Internal cement plaster to brickwork walls				
				Ddt				The height of the skirting must be deducted to determine the height of the paint area as previously measured
		3,00 2,00		Two coats PVA to internal plastered walls				
				Ddt				2,100 less 0,100
		3,00		19 x 76 mm meranti skirting a.b				= **2,000**
				&				
				Ddt				
				Two coats varnish to skirting not exceeding 300mm girth				
				(2)				

				PLAIN OPNING (cont)				**NOTES**
	2 /	2,10 0,22		E.o.o.b for fcgs a.b				Now we need to measure the reveals as per the specifications, in this example the same as the external finish which is facebricks. Refer to clause 25 and measured for two ends
				Lintol				
		3,00		Extra over brickwork for brick- on – end soldier course lintel pointed on face and 220mm soffit				
	4 /	3,40		150mm wide reinforcement built in horizontally				
				3,000+ 2/200(bearing) 3,400				The B.O.E lintel is measure same width as the opening
		3,00		220mm wide turning piece to lintel				The turning piece being the support for the b.o.e brickwork
				(3)				

				PLAIN OPENING (CONT) **Threshold**				**NOTES** This is the section of the floor within the opening.
		3,00 0,22		15 MPa concrete in surface bed a.b Super x 0,100 = m2 And 30mm thick untinted granolithic on concrete floor a.b				
		3,00		Formwork to edge of slab n.e 300mm wide				To edge of surface bed at opening
				END OF PLAIN OPENING ④				

Self Check

I am able to:	YES	NO
• Prepare a measuring list for taking-off a plain opening	○	○
• Measure a plain Opening	○	○
• Measure the finishings and adjustments for a plain opening	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Notes

Module 11

Measurement of Doors

Learning Outcomes

On the completion of this module the student must be able to:

- Compile the measuring list for measuring a flush door and steel frame
- Measure all the items for a flush door and steel frame
- Measure the adjustments for the flush door

11.1 Introduction

The measurement of doors follow closely that of the plain opening , the only difference being that you now a structure which makes up the opening which is the door frames and the door that fits into the frame.

Generally we will work with the two most commonly type of door frames found in most dwellings, being the steel door jamb and the timber door frame.

The steel door jamb will mostly be used internally and the timber door frame externally as will be shown in this module both systems has its own unique items to measure.

11.2 The measurement of steel jambs

·Pressed steel door frames shall be given in number stating the size of the door, its profile(whether single or double rebated), the thickness of the wall (to determine the total girth of the frame) and the description must include the fitted ironmongery to be fitted or accommodated with the frame. Refer to Clause 9 in the Metal Worker trade.

- Typical items to be considered in the taking-off for the door and frame will be the following:
  - **Door**
    - Flush door
    - Paint on door
    - Ironmongery
  - **Frame**
    - Steel jamb
    - Paint on steel jamb
  - **Deductions**
    - As per for the opening
  - **Add Lintol brickwork**
    - Brick reinforcement
  - Add threshold
    - Same as for the opening

Figures 11.1; **11.2** and **11.3** illustrate a typical single rebated and a typical double rebated steel door jamb and an elevation of a flush door fitted into a steel door jamb.

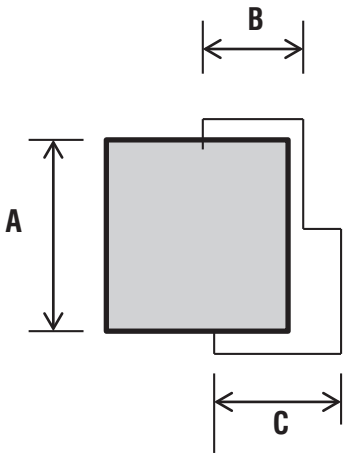


Figure 11.1 Single rebate

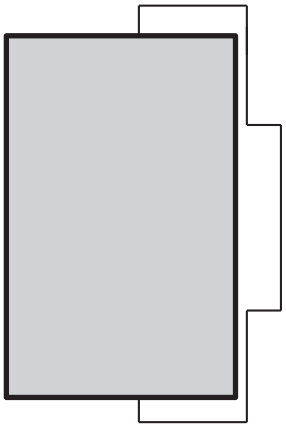


Figure 11.2 Double rebate

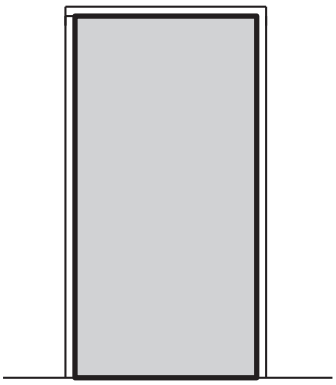


Figure 11.3 Flush Door

Worked example 11.1

Refer to **figures 11.1** and **11.3** and take off the quantities for the following internal door.

1. The flush door
2. The steel door jamb
3. All the adjustments

Specifications:

- **Structure**
  - 110mm brick wall
  - Stock bricks in 1:4 cement mortar
  - 100mm surface bed;15 Mpa concrete
  - Two course 75mm brick reinforcement with 250mm bearing
- **Finishes**
  - Plaster both sides
  - Two coats PVA on plaster surfaces
  - 19 x 70mm meranti skirting with toe varnish
  - 30 mm cement screed
  - 1,6mm vinyl asbestos floor tiles
- **Door**
  - 40mm x 810mm x 2030 hollow core flush door with commercial veneer and two coats varnish on door
  - 2 lever mortice lockset with chromium plated furniture
  - 40mm rubber door stop
- **Frame**
  - Single rebated galvanised steel door jamb including ironmongery
  - One primer, one undercoat and two coats enamel paint

				FLUSH DOOR AND STEEL DOOR FRAME **Measuring List** Door Paint on door Ironmongery Frame Paint on frame Adjustments- • Structure • Finishes				**NOTES**
		1		DOOR 40 mm hollow core flush door with veneer suitable for varnish on both sides, hung to steel frame & Lever mortice lockset with c.p furniture to soft wood and steel door frame & 40 mm rubber door stop fixed to concrete				See clause 1 to 4 under Ironmongery
				(2)				

				FLUSH DOOR AND STEEL DOOR FRAME (Cont)				**NOTES**
	2	0,85 2.07		Two coats on general surfaces of flush doors 0,810 2,030 Edge 0,040 0,040 = **0,850 2,070**				With flush doors the area must be measured flat and the extra area must be covered for the edges.
		1		FRAME Standard single rebated galvanized pressed steel door frame, for half brick wall, plastered both sides and for door size 40 mm x 810 x 2030.				Steel door frames are measure in number indicating, the type of material, galvanized or not, the size of the wall into which it must be built in, single or double rebate, as well as the size of the door which must be fitted into the frame. See clause 9 of the S.S
				(3)				

		0,26 4,95		**FLUSH DOOR AND STEEL DOOR FRAME (cont)** One coat calcium plumbate primer, one u/ct and two coats high gloss enamel paint on galvanized pressed steel door frames (3)				**NOTES** Painting to the steel frame is measured in square meters, that is taking the total exposed girth of the frame multiplied by the length Refer to Figure 11.1 Calculation for girth Wall thickness = 110 Add 2/2 x 20 = 080 Add 2 x 50 = 100 0,290 Less plaster 2 x 15mm 0,030 **0,260** Length for frame 2/2030 =4,060 =0,810 Edges 2/040 =0,080

				PLAIN OPENING (CONT) **Threshold**				**NOTES** This is the section of the floor within the opening.
		3,00 0,22		15 MPa concrete in surface bed a.b Super x 0,100 = m2 And 30mm thick untinted granolithic on concrete floor a.b				
		3,00		Formwork to edge of slab n.e 300mm wide				To edge of surface bed at opening
				END OF PLAIN OPENING (4)				

Self Check

I am able to:	YES	NO
• Compile a measuring list for the taking-off of the flush door	○	○
• Measure the items for the flush door and steel frame	○	○
• Measure the adjustments for the flush door.	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Notes

Module 12

Compiling the Bill of Quantities

Learning Outcomes

On the completion of this module the student must be able to:

- Describe the different processes involved in preparing a Bill of Quantities
- Complete the Squaring, checking abstracting and billing processes

12.1 Introduction

It is useful to repeat what was stated previously in module 5 with regard to the compilation of the final bill of quantities document. The next step in getting to the final bill of quantities is to collect similar items together and to place them to certain rules of order and sequences as set out in the Standard System , see the contents pages and the general instructions, clauses 1 to clause 9.

This book will follow the traditional form of abstracting, other forms like the `cut and shuffle methos' will be covered in the N6 text book.

The PROCESS OF PREPARING Bills of Quantities involves several definite stages, viz:

12.1.1 "Taking Off'

- the recording of the dimensions and descriptions of all labour and material items required for the work.

12.1.2 "Squaring and Checking "

- checking for the correctness and accuracy of all sidecasts and collections.
- checking all the series of dimensions within a group which must relate to the same unit of measurement.
- Timesing, multiplying and totalling each series of dimensions.
- Checking (recalculating) all the answers and totals [this rechecking is normally done with a different colour pen and by someone other than the person who squared the dimensions.

12.1.3 "Abstracting"

- the sorting , gathering together of identical items and transferring the dimensions onto "abstract paper" and checking the abstract.

12.1.4 "Casting and Reducing"

- "casting-up involves the totalling of the quantities in the deduct and addition columns, "reducing" referring to the rounding off of fractional quantities to whole units.

12.1.5 "Billing"

– this involves transferring the reduced items from the abstracts on to 'billing' paper and writing the draft 'bill'.

Having completed the "Taking-Off" process in the previous chapters we will now provide a brief introduction as to the principles involved in the other process with simple examples. More detail examples will be covered in the N5 and N6 textbooks.

12.1.6 Squaring and checking

The first step to check is to see that all the pages are inserted and that they are all numbered which will be used for references on the abstract.

The dimensions must now be squared which means calculating the volumes, areas and numbers contained in the dimension columns.

The person computing the calculations must take utmost care in recording the correct results [product] of each calculation using the correct digits under each other.

All figures must be clear and any untidy scribbling must be avoided at all times.

At all times all casts and mathematical calculations must be checked and ticked off by a second person.

Each waste collections which are being squared in the waste column must be checked and each calculation must be marked by a tick indicating that the checking has been done.

Once the dimensions have been squared the results must be checked by a different person, each being ticked, preferably with a different colour pen.

Special care must be taken where the second or third dimension appears under the dimension column as a squared or cubed item.

			Checking the waste calculations 30 000√ Less 4/0,220 = 0, 880 **29,120** √ The tick indicating the waste calculations have been checked
	29,12 0,60 0,20	3,49	The result of the squaring are now placed in the squaring column.

			Checking the waste calculations 2/10 000 = 20 000√ 2/5 000 = 10 000√ 30 000√ Less 4/0,220 = 0, 880 **29,120** √ The tick indicating the waste calculations have been checked
	29,12 0,60 0,20	3,49	The result of the squaring are now placed in the squaring column.

12.1.7 Abstracting

As stated previously the function of the abstract is to collect similar items together and to classify them primarily into their sections and subsequently according to the guidelines set out in the Standard System.

Specially ruled paper is used for recording the items from the left to the right of the sheet. Again as mentioned earlier in this book the spacing of the items and the neatness in booking of the items are vitally important not to mixed up the descriptions and the items. Rather err with too much space than too little.

A good abstract must have figures carefully and neatly written with digits properly set out under each other to eliminate any confusion in casting up the totals.

As with the taking-off process use could be made of abbreviations, words may be abbreviated wherever possible consistent with clearness and copied as recorded on the dimension sheets.

Care should be take and the items must be recorded according to the rules as set out in **clause 3** of the general instructions under Order of Items.

The following are some of the more important steps to follow with the abstracting:

- Write down the project name
- Number all the pages
- Use the correct add and deduct columns
- Copy accurately from dimension sheets
- Score out the each dimension or set of dimensions as it is being transferred
- Indicate the correct unit of measurements
- Draw a line under each item
- Use a separate sheet for each trade
- Allow sufficient space between items
- Tick off bottom of the dim paper as soon as transfer completed
- Follow the order as prescribed in the Standard System

Typical Abstract Sheet

Figure 12.1 illustrates how the items in the 'taking off' are marked off. A vertical line must be drawn through each description once you have transferred the item and the quantity applicable to it. The same procedure must be followed for every item until all the items are transferred to the correct trade on the abstract sheets. Each sheet must clearly indicate with a 'tick' when all the items on a sheet were transferred. Where dimensions are grouped or bracketed as in figure 12A a diagonal line is scored through the first item to be transferred.

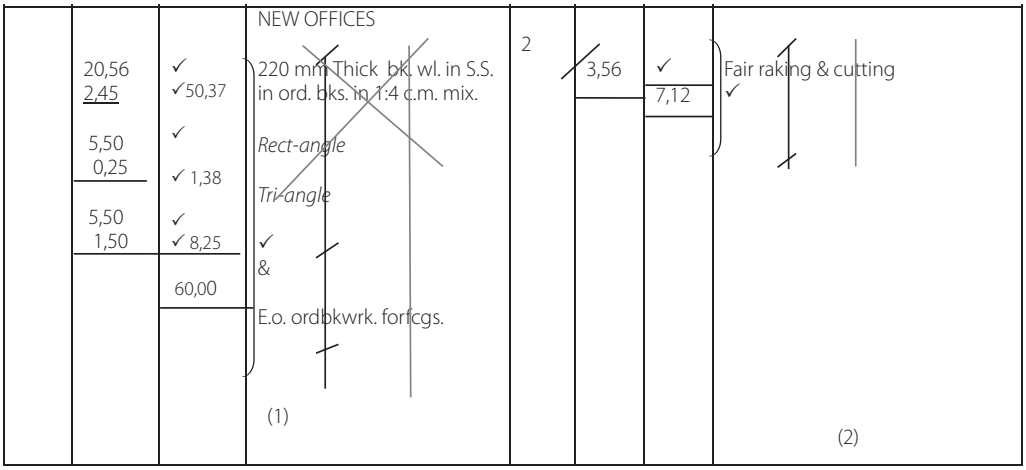


Figure 12.1

The transferring process will have to be checked by another person who in turn will draw another vertical line through the same items, but in a different colour ink.

Figure 12.2 will show what the abstract sheet looks like and how it must be used. The important information that needs to be provided on the abstract sheet are the following;

- The section work
- The trade
- The unit of the item
- The reduced amount

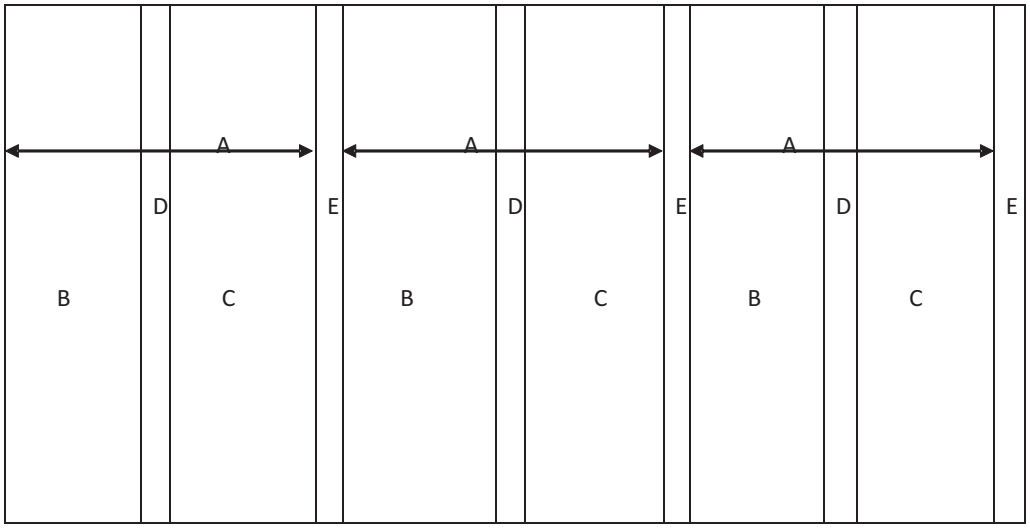


Figure 12.2

A The arrow indicates the space where the items are to be written.
B This is the column in which all the positive quantities are to be written.
C This is the column in which all the negative quantities are to be written preferably in red.
D This is the column in which the positive page reference numbers are written.
C This is the column in which the negative page reference numbers are written preferably in red.

Figure 12.3 shows how the information that are transferred from the 'taking off', are to be written up on the abstract sheet.

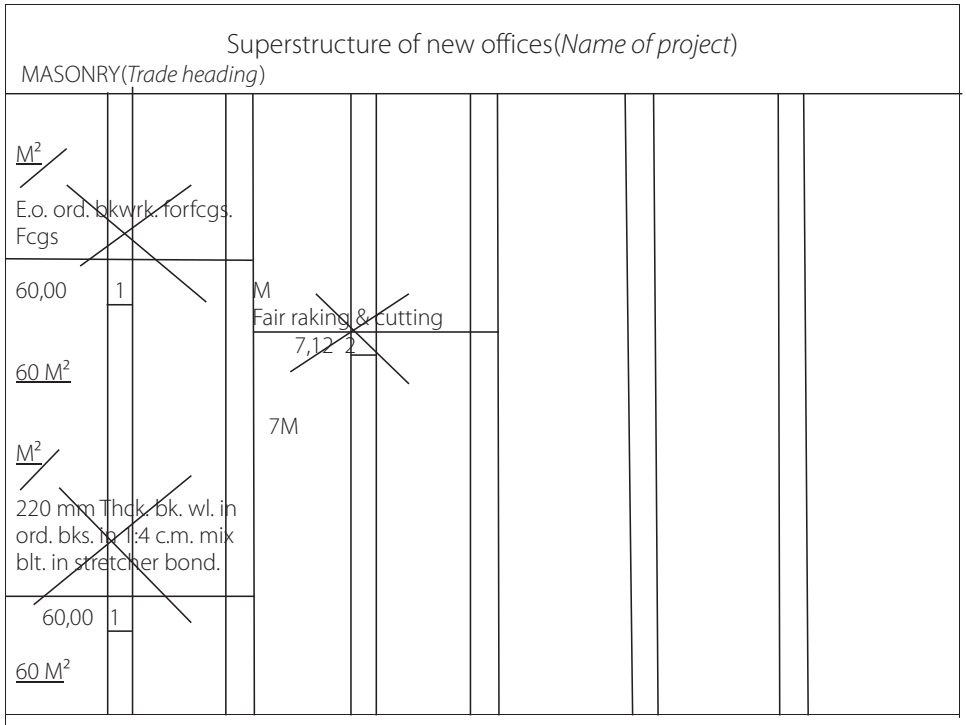


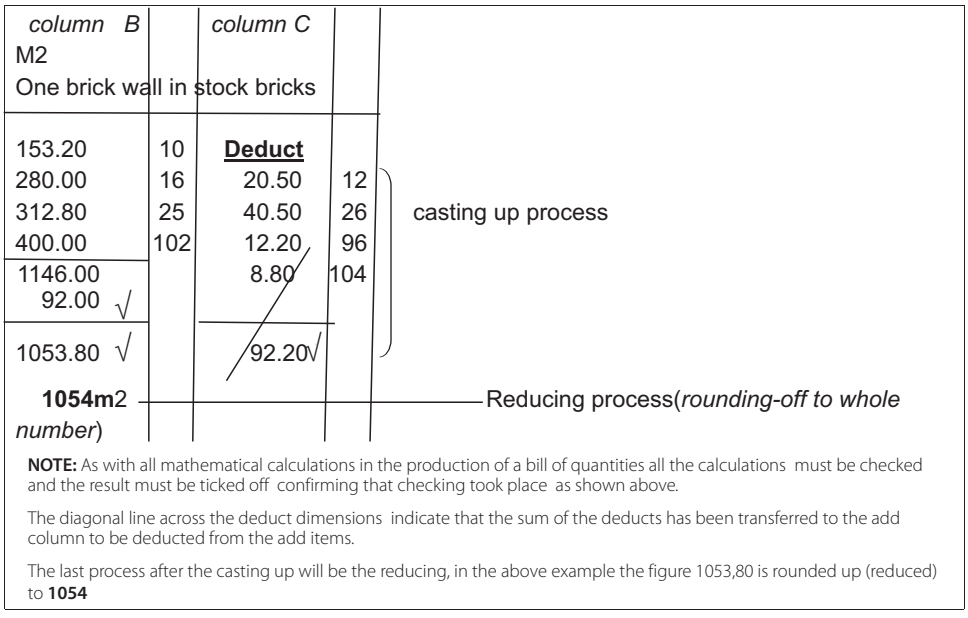
Figure 12.3

You will notice that the items are written on the abstract in the same order as indicated in the Standard System. If for instance a cubic meter item was measured, it would have preceded the square meter items. Also note the items are written up in staggered formation. All the quantities are positive, therefore no quantities will appear in the negative column. The item description and the reduced quantity will now be transferred to the bill paper sheet.

12.1.8 Casting up and reducing

Figure 12.4 indicates the intermediate steps of abstracting; "casting –up" and "reducing"

Casting–up being the addition and deductions as recorded in the dimension sheets whereas **Reducing** is the rounding off of the totals to the whole numbers as it would appear in the final bill of quantities.



NOTE: As with all mathematical calculations in the production of a bill of quantities all the calculations must be checked and the result must be ticked off confirming that checking took place as shown above.

The diagonal line across the deduct dimensions indicate that the sum of the deducts has been transferred to the add column to be deducted from the add items.

The last process after the casting up will be the reducing, in the above example the figure 1053,80 is rounded up (reduced) to **1054**

Figure 12.4

12.1.9 Billing

The writing of the bill is basically the final process in the preparation of the bill of quantities, it is the actual copying and transferring all the items from the abstract in the form of a schedule with ruled lines /columns as provided for in the Standard System.

The bill now becomes a legal document being part of the contract documents therefore the use of abbreviations is now restricted only to items which prevents the duplication of the same wording in the descriptions.

Apart from the items measured and recorded in the abstract the normal bill has a set range of preliminary items and each trade has a preamble describing the materials and workmanship at the beginning of each trade to eliminate any repetitions of the same materials and descriptions in other descriptions.

The bill of quantities is divided into the following sections:

- Preliminaries and General(temporary power and water; site establishments etc)
- General Preambles to the trade (All hard woods will be wrot meranti)
- Builders work(from clearing the site to final handover)
- Provisional Quantities
- Provisional Sums
- Contingencies
- Summary
- Form of Tender

In **Figure 12.5** the method of indicating that the items in the abstract have been transferred is indicated by drawing a diagonal line across the full abstract for that particular item.

M2 1.B wll	in	Stck bks									
20.50	5	**Ddt**									
30.60	6	12.50	10								
15.20	9	16.50	15								
9.60	21	3.50	23								
45.50	25										
		32.50									
121.40											
32.50											
88.90											
= 89 m2											

Figure 12.5

The Billing of each trade should begin on a new sheet or page which is ruled as shown in **figure 12.6.**

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT

Figure 12.6

The Item column is used to insert the reference for each trade item. Professional firms, each have their own preference, some will reference the bill from number 1 to infinity, others will reference each trade starting at 1 till the end of the trade, others again will letter A. It does not matter how it is reference as long as every item shown in the bill has page number and a reference number to be reference to.

Taking the item on the abstract sheet as indicated in **figure 12.5** the bill item will now look shown in **figure 12.7**

	BILL No. 5				
	MASONRY				
1	One brick wall in stock bricks in 1: 4 cement mortar built in stretcher bond	M2	89		
2	Extra over ordinary brickwork for brickwork for face brickwork	M2	78		
3	Extra over brickwork for brick-on-end soldier course band	M	16		
	Total Carried forward to summary on page 178				R

Figure 12.7

APPENDICES

1. ABBREVIATIONS

The abbreviations listed hereunder are some of the most commonly used by the professional quantity surveyors. Any student of quantity surveying must be well acquainted with a set of generally used abbreviations, although the contractions of some of the words are commonly made by the omissions of some letters with the meaning b xt of the description.

a.b.	as before
a.b.d.	as before described
adj.	adjacent
alt.	alternate
approx.	approximately
appvd.	approved
ard.	around
arch.	architrave
asb.	asbestos
asph.	asphalt
a.u.	as usual
avail.	available
av.	average
a.w.p.	as work proceeds
B.	brick (HB or 1 B)
b.b.	barge board
bd.	bead
bdg.	boarding
b.fxg.	before fixing
b.i.	build in
	built in
	building in
bit.	bituminous
b.j. & ptd.	bedded, jointed and pointed
bk.	brick
bkt.	bracket
bkw. or bwk.	brickwork
blt.	built
b.m.	birdsmouth
bm.	beam
bo.	bolt or bolted
b.o.	bolted on
bot. or btm.	bottom
b. & pt.	bed and point
br.	Brass
brr.	bearer
b/s.	both sides
b.s.m.	both sides measured
c.a.	cart away
cav.	cavity
c.c.n.	clost copper nailed
c. & f.	cut and fit
C/C.	centres
chfd.	chamfered
chy.	chimney
c.i.	cast iron
circ.	circular
C/L.	centre line
clg.	ceiling
co.	coat
c/o.	consisting of
col.	column
compo.	composition
conc.	concrete
cop.	copper (see also cu.)
corr. iron	corrugated iron
cos.	course
covg.	covering
c.p.	chromium plated
c. & p.	cut and pin
c/sk.	countersunk
c.s.g.	clear sheet glass
c.t.&b.	cut, tooth and bond
ct.	cement
ct.m. or c.m.	cement mortar
cts.	coats
c. & w.	cutting and waste
cu.	copper (see also cop.)
cupd.	Cupboard
dble.	double
ddt.	deduct
descr.	describe
diam. or	diameter
dist.	distemper
d. & m.	dowels & mortices
dp.	deep
d.p.c.	damp proof course
d.p.m.	damp proof membrane
dr.	door
ea.	each
e.g.	eaves gutter
e.m.	elsewhere measured
E.o.	extra over
e.w.	elsewhere

ex.	extra
Ex.o.o.b. or	extra over
E.o.o.b.	ordinary brickwork
exc.	exceeding
excav.	excavate
excl.	excluding
exec.	executed
exg.	existing
ex. l. & m.	extra labour and material
extl.	external
extr.	extreme
exp. jnt.	expansion joint
facgs.	facings
fanlt.	fanlight
fdns.	foundations
f.e. & ar. or	fair edge and arris
f.e. & a.	
f.f.	fair face
fin.	finished
f.l. & br.	framed, ledged & braced
flrg.	flooring
fmwk.	formwork
F.o.	fixing only
f./o.	formed offoll. following
footgs. or ftgs.	footings
fr.	frame
frd.	framed
fxd.	fixed
fxg.	fixing
ga.	gauge
galv.	galavanised
G.F.	ground floor
gen.	general
g.l.	ground level
g.m.s.	galvanised mild steel
grano.	granolithic
g.s.	general surfaces
g.s.i.	galvanised sheet iron
grth.	girth
H.B.	half back
h.b.w.	half back wall
h. & c. hook	hat and coat hook
h.c. or h/c.	hardcore
H.d.galv.	hot dip galvanised
hi.	high
h.i.	hoop iron
h.n. & w.	head. nut & washer
horzl. or horiz.	honzontal
h.p.	high pressure
h.r.	half round
H.t.	high tensile
h. u.	horsing up
h/w	hollow wall

i.c.	inspection chamber
i.c.p.	internal cement plaster
incl.	including
intl.	internal
inv.	inverted
irreg	irregular
jt.	joint
jsts	joists
k. & p.	knot and prime
k.p.s. &	knot, prime. stop & three coats paint
Le	angle
lab.	labour
len(s).	length(s)
lg.	long
l.p.	low pressure
l.w.	limewash
matl.	material
max.	maximum
M.C.	mass concrete
m.g.	make good
m.h.	manhole
mi.	mitres
min.	minimum
mo.	moulded
m.s.	mild steel
m/s	measured separately
msd.	measured
n.e.	not exceeding
necy.	necessary
no.	number
n.w.	narrow widths
o/a.	overall
o.c.n.	open copper nailing
opng.	opening
or eq.o.a.	or equal other approved
o/s.	one side
P.C.	prine cost
pavg.	paving
pce.	piece
plast.	plaster or plastered
pl. to	plugged to
p.m.	purpose made
p.o.	planted on
posn.	position
s.a.	set aside
screwbo. or	screwbolt
scw. bo.	
scwd.	screwed

s.e.	stop end
sel.	selected
sktg.	skirting
s.l.	short lengths
sm.	smooth
s.o. & c.	strike off and cure
soff.	soffit
splay. or spl.	splayed
s.q.	small quantities
s.r.a.	slightly rounded angle
s/s	stainless steel
s. & s.	sides and soffits
S.S.A.P.	sawn South African pine
st.	stone
s.t.	surface trenches
stdd.	standard
surf.	surface(s)
susp.	suspended
s. & v.p.	soil and vent pipe
T.	tee
T.C.	terra cotta
temp.	temporary
t. & g.	tongued and grooved
t.g. & v.jtd.	tongued, grooved and V-jointed
t.e.	top edge
tgd.	tonguedpr. pair
pre. conc	precast concrete.
prep.	prepare or prepared
p.r.f.i. & r.	part return, fill in and ram
projn.	projection
projtg.	projecting
prov.	provide
p. & f.	plugged and fixed
p. & s.	planking & strutting or plugged & screwed
pntg.	pointing
pt.	point or paint
ptg.	painting
P.V.A.	polyvinyl acetate (paint)
P.V.C.	polyvinyl chloride (sheeting or tubing)
p.t.w.	plugged to wall
Q.S.	quantity surveyor
q.t.	quarry tile
rakg.	raking
R.C.	reinforced concrete
r.c & w	raking cutting & waste
rdd.	rounded
reb.	rebated
rec.	receive
rect.	rectangular
reqd.	required
rfg.	roofing
R.F. & S.	render, float and set
rfcd.	reinforced
rfct.	reinforcement
r.f. & r.	return, fill and ram
ri.	reduced level
r.m.e.	returned mitred end
Ro. or ro.	rough
R.o.c.	risk of collapse
r. & s.	render end set
r.s.j.	rolled steel joist
r.w.p.	rainwater pipe
th.	thick
thro.	through
tlg	tiling
T.p.	turning piece
tr.	trench
t.u.	turned up
u/ct.	undercoat
u/p.	underpinning
u/s.	underside
vert.	vertical
vv.b.	woodblock
w.b.g.	wire balloon grating
w/w	window
wi. or	with
w.g.w. tlg.	white glazed wall tiling
wl.	wall
w.p.	wall plate
wt.	wrot
W.S.A.P.	wrot South African pine
wthd.	weathered
wthrg.	weathering
x grain	cross grain
x tgd.	crosstonged
xtg.	existing
xtl.	external
1 ce	once
2 ce	twice
3 ce	thrice

2. TYPICAL BILL ITEMS

	EARTHWORKS(PROVISIONAL)				
	Site Clearance				
A	Digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth, bush, etc	M2			
B	Strip average 150mm thick layer of top soil and stockpiling on site	M2			
	Excavation, Filling etc				
C	Excavate in earth not exceeding 2m deep for trenches	M3			
D	Risk of collapse to sides of trench not exceeding 1,5m deep	M2			
E	Keeping excavations free of water	Item			

	MASONRY				
	Brickwork				
A	One brick wall (220mm)in stock bricks in class 3 mortar	M2			
B	Half brick wall(110mm) in stock bricks in class 3 mortar	M3			
C	Extra over brickwork for brick-on-edge header course lintel	M			
D	Fair raking cutting	M			
E	110 x 75mm lintols in lengths not exceeding 3m	M			
F	Extra over brickwork for face bricks pointed with recessed horizontal and vertical joints in class 3 mortar	M2			
	Blockwork				
G	190mm blockwork walls in class 3 mortar with cores filled solid with mortar	M2			
H	290mm Hollow block walls of two 90mm skins including wire ties	M2			
J	4mm diameter roof tie 2m girth bent double with one end fixed to timber and other end built into brickwork	No			

	CONCRETE , FORMWORK AND REINFORCEMENT				
A	Unreinforced concrete 15 Mpa in strip footings	M3			
B	Unreinforced concrete 15 Mpa in surface beds	M3			
C	Formwork to edges not exceeding 300mm high	M			

	WATERPROOFING				
A	One layer of 375 micron Brickgrip DPC embossed damp proof course	M2			
B	One layer of 250 micron Gunplus Plastic USB Green waterproof sheeting under surface beds	M2			

	ROOF COVERING				
A	Roof covering with pitch not exceeding 50 degrees with 330 x 400mm concrete tiles laid on an underlay of 350mmmicron plastic sheeting nailed through underlay to 38 x 38mm sawn softwood battens at 320mm centres	M2			
B	Ridge tiles to match roofing tiles bedded and pointed in 1: 3 cement mortar tinted to match tile colour	M			
C	1.6mm Corrugated single spelter galvanised sheet steel roof covering with pitch not exceeding 50 degrees fixed to timber purlins	M2			
D	Galvanised ridge capping with 600mm girth	M			

	CEILINGS , PARTITIONING AND ACCESS FLOORING				
A	5mm Rhino gypsum plasterboard ceiling including 38 x 38mm sawn softwood brandering at 400mm centres	M2			
B	75 mm Coved Rhyno gypsum plasterboard cornices	M			

	FLOOR COVERINGS,PLASTIC LININGS				
A	300 x 300 x 1,6mm “Marleyflex” semi-flexible vinyl tiles on floors	M2			
B	70mm “Marleyflex” vinyl skirtings	M			

	CARPENTRY AND JOINERY				
A	110 x 38 mm sawn softwood wall plates	M			
B	70 x 50mm sawn softwood purlins	M			
C	110 x 38mm Rafters in lengths exceeding 2,4 and not exceeding 3,9m	M			
D	110 x 38mm Bolted roof truss members in lengths not exceeding 2,4m	M			
E	230 x 38mm Wrot softwood Fascias and barge boards	M			
F	70 x 20mm wrought Meranti skirting	M			
G	40mm hollow core flush doors with commercial veneer sixe 810 x 2030 mm high	No			

	IRONMONGERY				
A	75mm Brass hinge with nylon washers	No			
B	100mm brass barrel bolt	No			
C	2 lever Lockset	No			

	METALWORK				
A	1,2mm Galvanised pressed steel single rebated door frames suitable for half brick walls for door size 0,810 x 2,030mm high	No			

	PLASTERING				
A	30mm untinted granolithic on concrete floors	M2			
B	Untinted granolithic skirting 70mm high	M			
C	Internal Cement plaster on brickwork	M2			
D	Internal Cement plaster on narrow widths	M2			

	TILING				
A	152 x 152 x 5mm White glazed ceramic tiles on brickwork	M2			
B	152 x 152 x 5mm White glazed ceramic tiles on narrow widths	M2			

	PLUMBING AND DRAINAGE (PROVISIONAL)				
A	uPVC 100mm half round eaves gutter	M			
B	70mm uPVC rainwater pipes	M			
C	Extra over 70mm uPVC rainwater pipe for shoe	No			

	GLAZING				
A	4mm Clear float glass glazing to wood with pinned on beads (beads elsewhere) in panes exceeding 0,1m2 and not exceeding 0,5m2	M2			
B	5mm Sivered floatglass copper backed mirror with polished edges size 500 x 500mm fixed with double sided adhesive tape.	No			

	PAINTWORK				
A	One coat zinc chromate prime, one undercoat and two coats alkyd enamel paint on galvanised steel door frames	M2			
B	One coat wood primer, one coat undercoat and two coats alkyd enamel on roof timbers at eaves and verges	M2			
C	Three coats clear varnish on skirtings not exceeding 300mm girth	M			

Self Check

I am able to:	YES	NO
• Understand the different processes involved in preparing a Bill of Quantities	○	○
• Do Squaring and Checking	○	○
• Do Abstracting	○	○
• Do the Billing processes	○	○

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Past Examination Papers

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

APRIL 2013

NATIONAL CERTIFICATE

QUANTITY SURVEYING N4

(2050015)

5 April 2013 (X-Paper)
09:00 – 12:00

NOTE: The Standard System of Measuring Building Work must NOT be used.

Non-programmable calculators may be used.

This question paper consists of 5 pages.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

Answer ALL the questions.

1. Read ALL the questions carefully.
2. Number the answers according to the numbering system used in this question paper.
3. SECTION A must be answered on the dimension, abstract and billing papers.
4. SECTION B must be answered in the ANSWER BOOK.
5. The work must be answered according to the STANDARD SYSTEM.
6. Red and green ink is NOT allowed.
7. Do NOT staple loose pages.
8. ALL work you do not want to be marked must be clearly crossed out.
9. In QUESTION 1 the word NIL must be used on the dimension paper.
10. Write neatly and legibly.

SECTION A

QUESTION 1

Refer to the attached DIAGRAM SHEET.

The foundation plan and a section of an out-building are given (not to scale).

SPECIFICATIONS:

Clear site 1,5 m beyond the external walls
15 MPa concrete in trenches
Brickwork in stretcher bond
External face brick TWO courses below ground level
Assume any specification not shown

Take off the foundation up to the underside of surface bed. (30)

Square, abstract, reduce and bill only the concrete work. (10)

TOTAL SECTION A: [40]

SECTION B

QUESTION 2

Measure the items regarding the door frame using the measuring list below.

2.1 Draw to scale 1 : 10 a four-panelled door using the following specifications:

Door size: 2 030 mm x 810 mm

44 x 1 00 mm top rail
44 x 100 mm stile
44 x 100 mm muntin
44 x 220 mm middle rail
44 x 220 bottom rail (10)

2.2 Write the following abbreviations in full:

2.2.1 c.s.g.

2.2.2 PVA

2.2.3 c.m.

2.2.4 s.t.

2.2.5 I.C.P. (5x1) (5)

2.3 State the unit of measurement of the following:

2.3.1 Pre-cast concrete lintels

2.3.2 Rhino board ceiling

2.3.3 Offset pipe

2.3.4 Hardcore

2.3.5 Window cill (5x1) (5)

[20]

QUESTION 3

3.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A-C) next to the question number (3.1.1-3.1.5) in the ANSWER BOOK.

3.1.1 The primary function of the standard system is to ... the bill of quantities.

A standardise
B legalise
C accommodate

3.1.2 The Standard System of Measuring building work is a book and can be classified as ...

A fiction.
B a manual.
C a dictionary.

3.1.3 The quantity surveyor uses the Standard System of Measuring building work as a reference when he/she is ...

A squaring.
B taking off.
C estimating.

3.1.4 The tenderer uses the Standard System of Measuring building work as a reference when he/ she is ...

A taking off.
B estimating.
C squaring.

3.1.5 The Standard System of Measuring building work is published by the ...

A Association of South African Quantity Surveyors.
B Institute of South African Architects.
C South African Bureau of Standards. (5x1) (5)

3.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (3.2.1-3.2.5) in the ANSWER BOOK.

Preliminaries and general items are ...

3.2.1 The preambles to trades.

3.2.2 Indirect expenditure such as security services.

3.2.3 Overheads carried by the contractor.

3.2.4 to be paid by the owner.

3.2.5 regulations and do not cost anything. (5x1) (5)

3.3 Explain the following terms normally used by the quantity surveyor in measuring:

3.3.1 Measuring list

3.3.2 Query list

3.3.3 Side casts

3.3.4 Collections

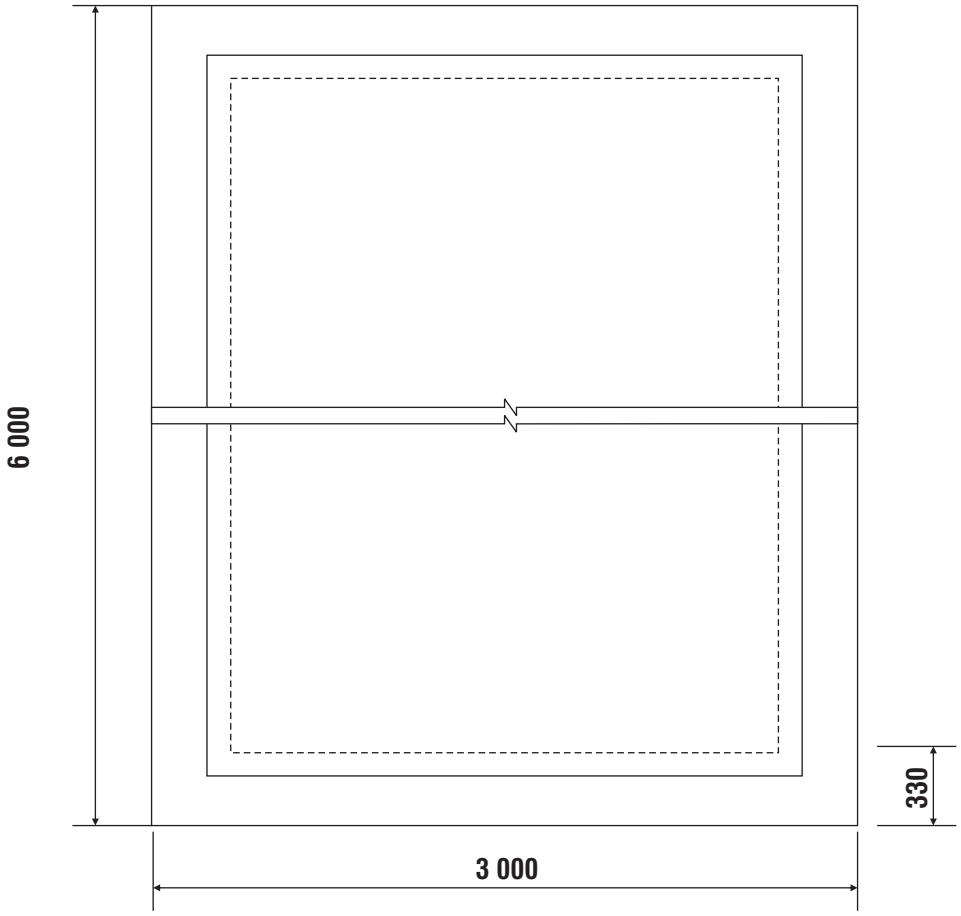
3.3.5 Reference notes (5x1) (10)
[20]

QUESTION 4

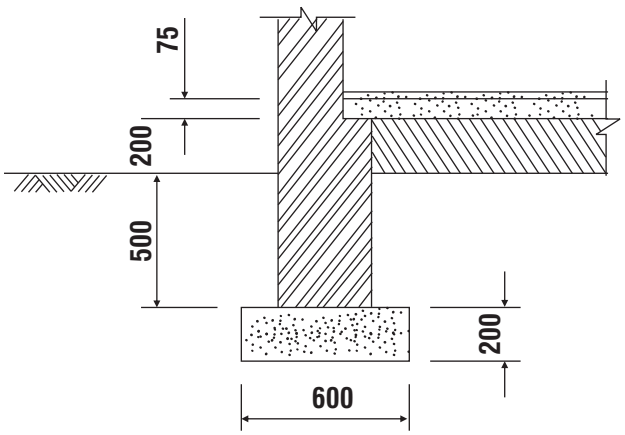
4.1	State the FIVE general rules of abstracting.		(5)
4.2	State FIVE functions of the quantity surveyor.		(5)
4.3	What is the relationship of the bill of quantities to the following people?		
4.3.1	Owner		
4.3.2	Clerks of works		
4.3.3	Architect		
4.3.4	Contractor		
4.3.5	Quantity surveyor	(5x2)	(10)
			[20]

TOTAL SECTION B: 60
TOTAL: 100

DIAGRAM SHEET



PLAN
SCALE 1:25



SCALE
SCALE 1:25

Past Examination Papers

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

APRIL 2012

NATIONAL CERTIFICATE

QUANTITY SURVEYING N4

(20050004)

20 March (X-Paper)
09:00 – 12:00

REQUIREMENTS:

Dimension paper	**(BOE 8/12)**
Abstract paper	**(BOE 8/10)**
Billing paper	**(BOE 8/11)**

Non-Programmable calculators may be used.
NOTE: The Standard System must NOT be used.
This question paper consists of 6 pages and a 1-page diagram sheet.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A must be answered on the dimension, abstract and billing papers.
3. SECTION B must be answered in the ANSWER BOOK.
4. Read ALL the questions carefully.
5. The work will be answered according to the STANDARD SYSTEM OF MEASURING BUILDING WORK.
6. Do NOT use a red or green ink.
7. DO NOT staple loose pages.
8. Number the answers according to the numbering system used in this question paper.
9. ALL work you do NOT want to be marked must be clearly crossed out.
10. In QUESTION 1 the word NIL must be used on the dimension paper.
11. Write neatly and legibly.

SECTION A

QUESTION 1

Refer to DIAGRAM SHEET 1 (attached).
The foundation plan and a section of an outbuilding are given (not to scale).

SPECIFICATIONS:

Clear site 2 m beyond the external walls
15 MPa concrete
Brickwork in stretcher bond with cement clay
Stock bricks internally
Face bricks externally TWO courses below ground level
Ground level 185 mm above from top of concrete footing

Assume ANY specification not shown.

1.1 Measure ALL the quantities for the foundations up to the underside of surface bed. (26)

1.2 Square, abstract, reduce and bill the earthworks only. (14)

TOTAL SECTION A: [40]

SECTION B

QUESTION 2

2.1 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (2.1.1 - 2.1.1 0) in the ANSWER BOOK.

2.1.1 An article of specific size, design or material that is specially manufactured to suit the specification.

2.1.2 Paint items, which usually are kept separate and grouped together.

2.1.3 Written order from the architect authorising a change of work altering the amount shown in the contract.

2.1.4 The period, after completion of a contract, during which a contractor is required to make good at his/her expense any work which needs repairs.

2.1.5 A percentage of the money to the contractor and retained for repairs and is only paid after the maintenance period.

2.1.6 A document issued by the architect to allow an intermediate payment to the builder.

2.1.7 The filling and sandpapering of timber that has deepening or holes caused by nails, screws and splintering.

2.1.8 A first coat on new wood or metal to ensure that the paint will stick to the surface.

2.1.9 A suitably graded granular fill used as sub-base under floors which is to be fully compacted using vibrating mechanical equipment

2.1.10 An intermediate payment by the owner to a builder. (10)

2.2 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (2.2.1 - 2.2.1 0) in the ANSWER BOOK.

2.2.1 The bills of quantities are prepared by the quantity surveyor.

2.2.2 During the pre-contract period the bill of quantities are used to find a contractor.

2.2.3 During the contract period the bills of quantities are used as a basis for interim valuations.

2.2.4 During the post-contract period the bills of quantities are used to estimate future projects.

2.2.5 The fundamental function of the bill of quantities is to make it difficult for chancers to enter the building industry.

2.2.6 An advantage of working with bills of quantities is that it is easily worked out what the workers should be paid.

2.2.7 In the bills of quantities, the total cost is established for labour and material.

2.2.8 The format (appearance) of the bills of quantities is determined by the rules found in the principal Building Agreement.

2.2.9 Preambles appear at the beginning of each trade.

2.2.10 The bills of quantities represent the amount and value of the contractor's work and the means of adjusting and settling the contract (10)

[20]

QUESTION 3

3.1 Make a neat sketch of a vertical section through the roof eave and top part of a one-brick external wall.

Use the following specifications:

- 38 x 114 mm rafter and tie beam
- 38 x 114 mm wall plate
- 50 x 76 mm purl ins
- Corrugated iron roof covering
- 12 x 225 mm fascia board
- 300 mm overhang at eaves
- Plaster internally and externally
- 30° pitch (10)

3.2 State the unit of measurement for the following:

3.2.1 Face brick arches

3.2.2 In situ concrete

3.2.3 Precast concrete lintels

3.2.4 Window sill

3.2.5 Steel window frame (5)

3.3 Give the standard abbreviations for the following expressions used during measurements:

3.3.1 Not exceeding

3.3.2 One and a half brick wall

3.3.3 Foundations

3.3.4 Deduct

3.3.5 Cubic metres (5)

[20]

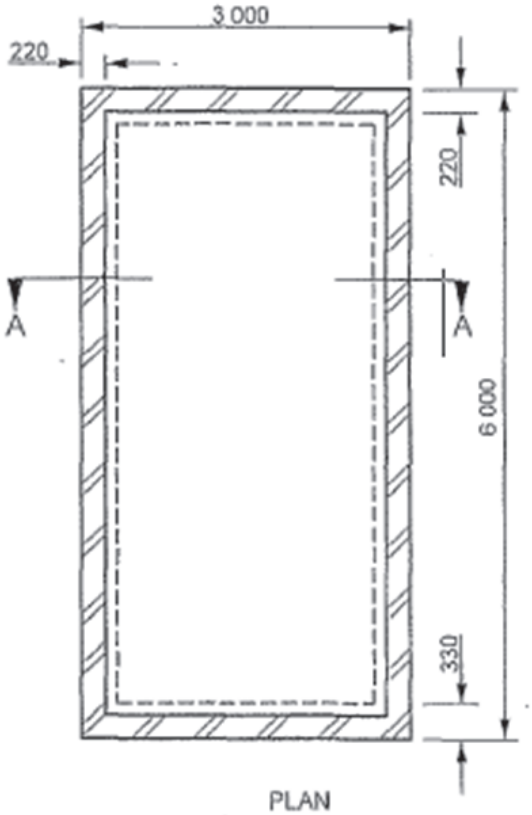
QUESTION 4

4.1	List FIVE functions of the quantity surveyor.	(5)
4.2	Define the following:	
4.2.1	Drawings	
4.2.2	Specifications	
4.2.3	Bill of quantities	
4.2.4	Standard form of building contract	
4.2.5	Standard system of measuring builders' work	(10)
4.3	State the procedure for preparing the bill of quantities.	(5)

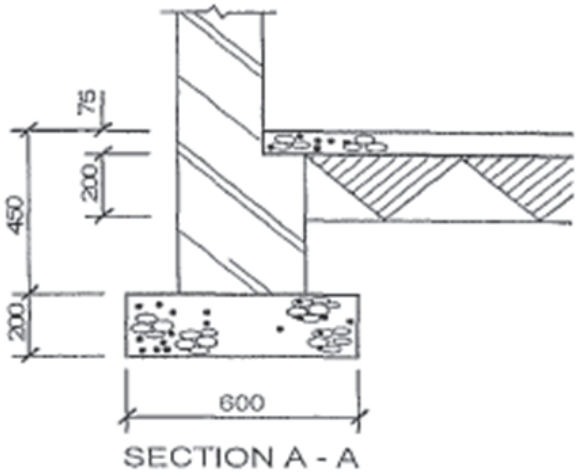
[20]

TOTAL SECTION B: 60
TOTAL: 100

DIAGRAM SHEET



PLAN



SECTION A - A

Past Examination Papers

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NOVEMBER 2011

NATIONAL CERTIFICATE

QUANTITY SURVEYING N4

(2050004)

9 November (X-Paper)
09:00 – 12:00

REQUIREMENTS:
Dimension paper (BOE 8/12)
Abstract paper (BOE 8/10)
Billing paper (BOE 8/11)

Non-Programmable calculators may be used.
NOTE: The standard system for the measuring of building work must NOT be used.

This question paper consists of 5 pages and 2 annexures.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. SECTION A must be answered on the dimension, abstract and billing papers.
4. SECTION B must be answered in the ANSWER BOOK.
5. The work must be answered according to the STANDARD SYSTEM.
6. Do NOT use red or green ink.
7. DO NOT staple loose pages.
8. ALL work you do NOT want to be marked must be clearly crossed out.
9. In QUESTION 1 the word NIL must be used on the dimension paper.
10. Number the answers according to the numbering system used in this question paper.
11. Write neatly and legibly.

SECTION A

QUESTION 1

Refer to ANNEXURE 1 (attached).

The elevation and a section of a door and frame are given (not to scale).

SPECIFICATIONS:

- 838 x 1 981 mm meranti three panel door
- External face brick
- Internal fair face
- Soldier course lintel externally
- 75 mm x 100 mm standard concrete lintel internally
- 20 mm granolithic on floor, threshold and riser
- 2 coats varnish on meranti surfaces
- One under coat and two coats enamel on steel lining

1.1 Take off the door opening including ALL adjustments. (30)

1.2 Square, abstract, and bill only the paintwork on the door lining. (10)

TOTAL SECTION A: [40]

SECTION B

QUESTION 2

2.1 Label the wooden window drawing on the attached ANNEXURE 2 by writing only the answer next to the question number (2.1.1 - 2.1.1 0) in the ANSWER BOOK. (10)

2.2 Give the full description for each of the following abbreviations:

2.2.1 alt

2.2.2 a.u

2.2.3 c.m

2.2.4 s.t

2.2.5 fcgs (5)

2.3 Give the unit of measurement for each of the following:

2.3.1 Clear site

2.3.2 Rainwater gutter

2.3.3 Filling under floors

2.3.4 Roof covering

2.3.5 Concrete in footings (5)

[20]

QUESTION 3

3.1 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (3.1.1 - 3.1.1 0) in the ANSWER BOOK.

3.1.1 In the bill of quantities, the total cost is established for labour and material.

3.1.2 The extra over brickwork for facing in beam filling must be given in square meters.

3.1.3 Wall plates should be kept separate according to various category lengths.

3.1.4 The building surveyor sets out buildings.

3.1.5 Cover strips should be given in meters including mitres.

3.1.6 Preambles are the general items of work which are not part of the actual construction.

3.1.7 Beam filling is sometimes measured with walls.

3.1.8 Hardcore shall be measured in cubic meters.

3.1.9 Two and a half brick foundation walls shall be given in cubic meters.

3.1.10 The Standard System of Measuring Builders Work lists all building materials available in South Africa. (10)

3.2 What is the quantity surveying term for each of the following:

3.2.1 The list of items to be measured

3.2.2 The list to show which taker off is responsible for various sections which are to be measured

3.2.3 The list of uncertain items to be cleared

3.2.4 The controlling of each and every calculation by a second person

3.2.5 The waste calculation during taking off

3.2.6 The general calculation of the centre lines prior to taking off

3.2.7 The calculation of approximate costs for a project

3.2.8 Explanations on dimension paper to show where descriptions and dimensions come from

3.2.9 Freehand drawings which are made by the quantity surveyor

3.2.10 The guide with uniform rules for the preparation of the bill of quantities (10)

[20]

QUESTION 4

4.1 Explain the function of the abstract.(5)

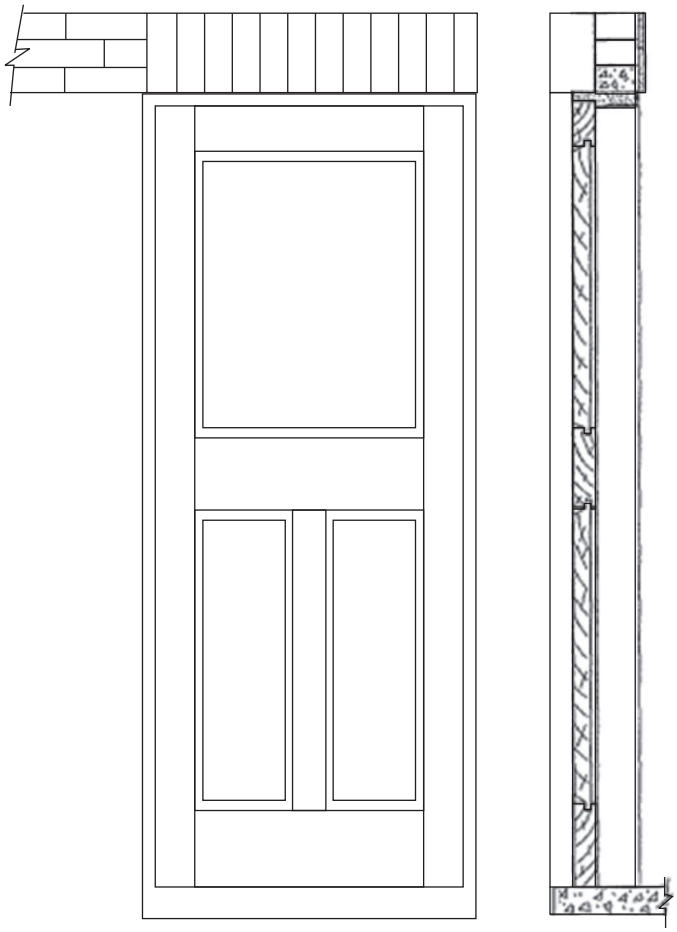
4.2 Give the FIVE points which the taker-off should bear in mind when measuring. (5)

4.3 Describe the function of the preliminary and general items in the bill of quantities. (5)

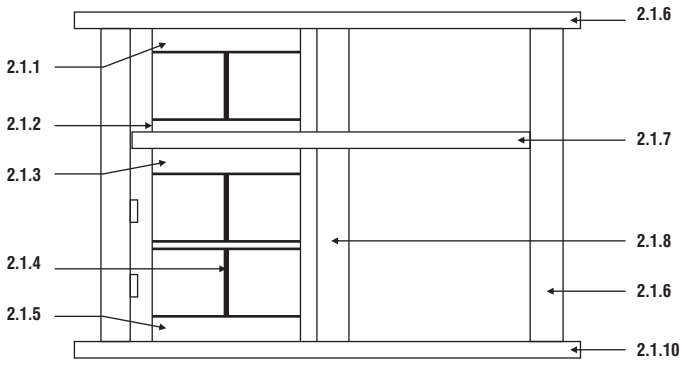
4.4 Describe FIVE principles for framing good descriptions in the bill of quantities. (5)

[20]
TOTAL SECTION B: 60
TOTAL: 100

ANNEXURE 1



ANNEXURE

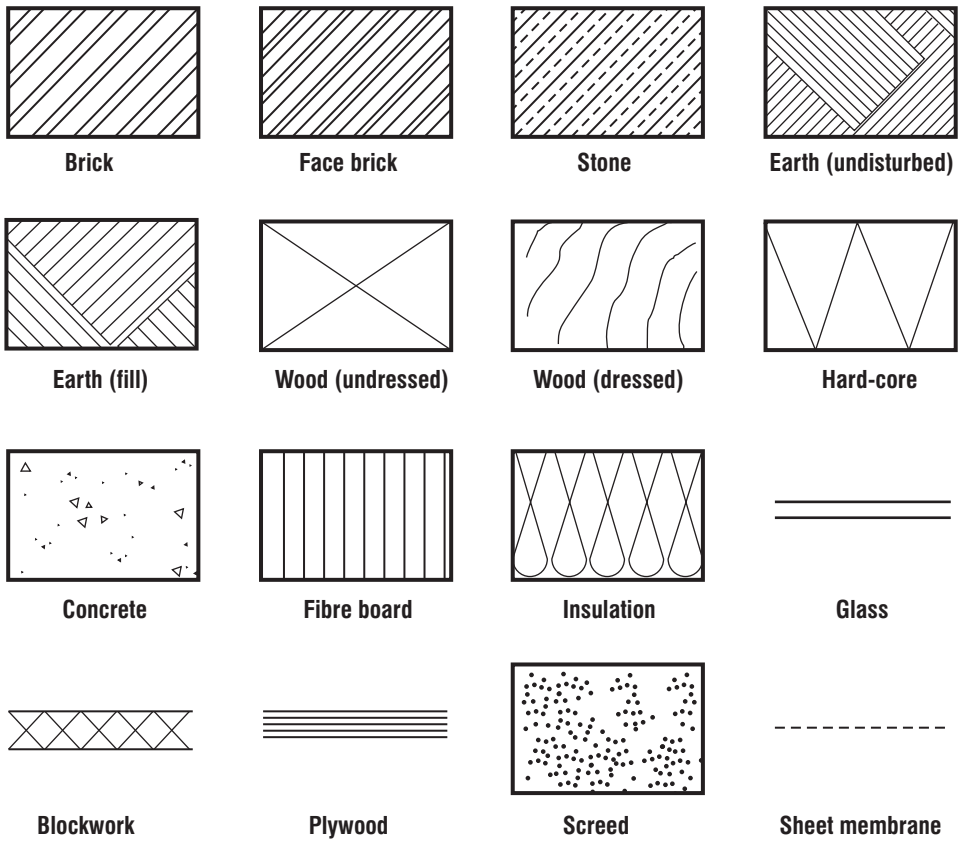


APPENDICES

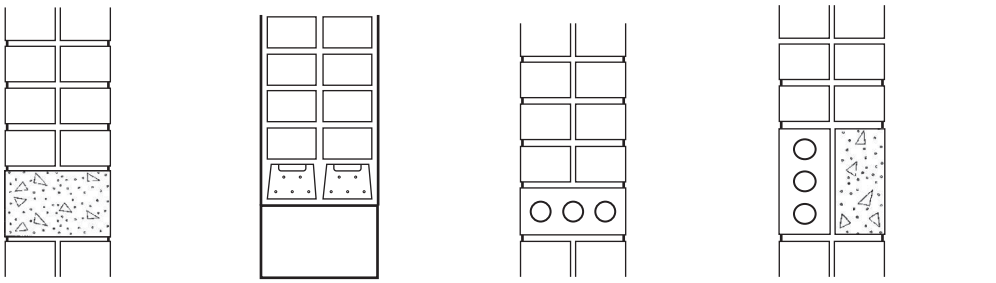
Hatching patterns

Where detail elements are being cut through as in a cross-section or section through in the floor plan layout or elevation, it is appropriate to show hatching to denote the material from which they are made.

Typical hatching patterns are shown below. The most common hatching patterns are brickwork and block work.

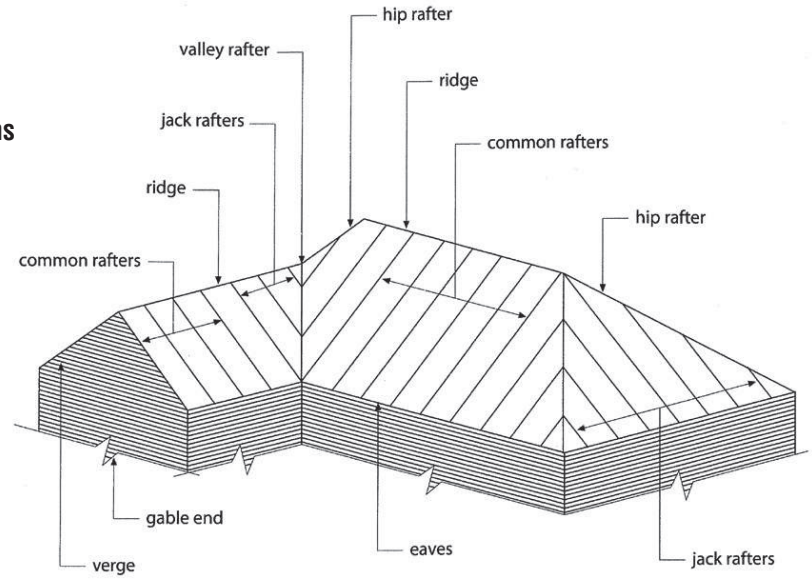


Different types of lintels

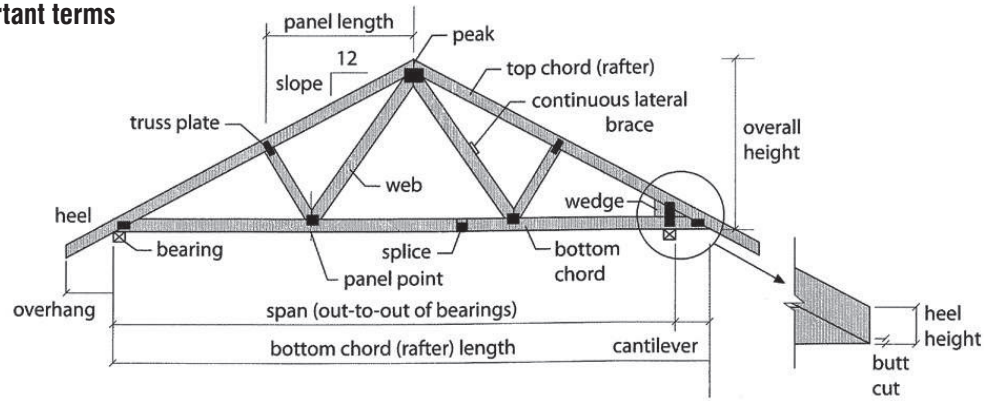


ROOF TRUSSES

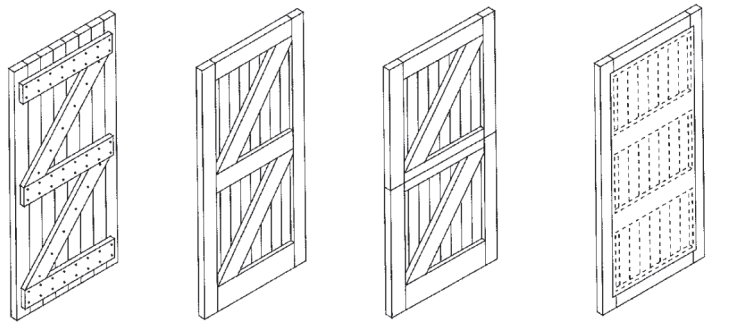
Roofing and truss terms



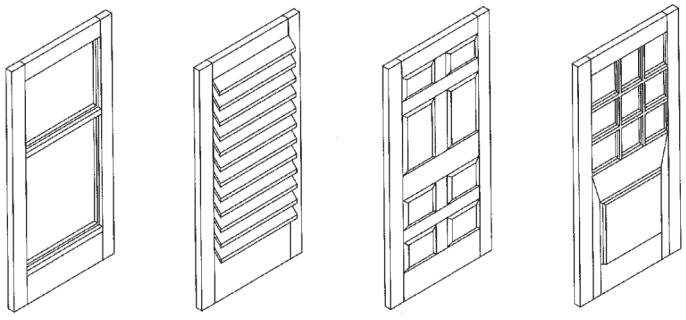
Important terms



Types of doors used internally and externally



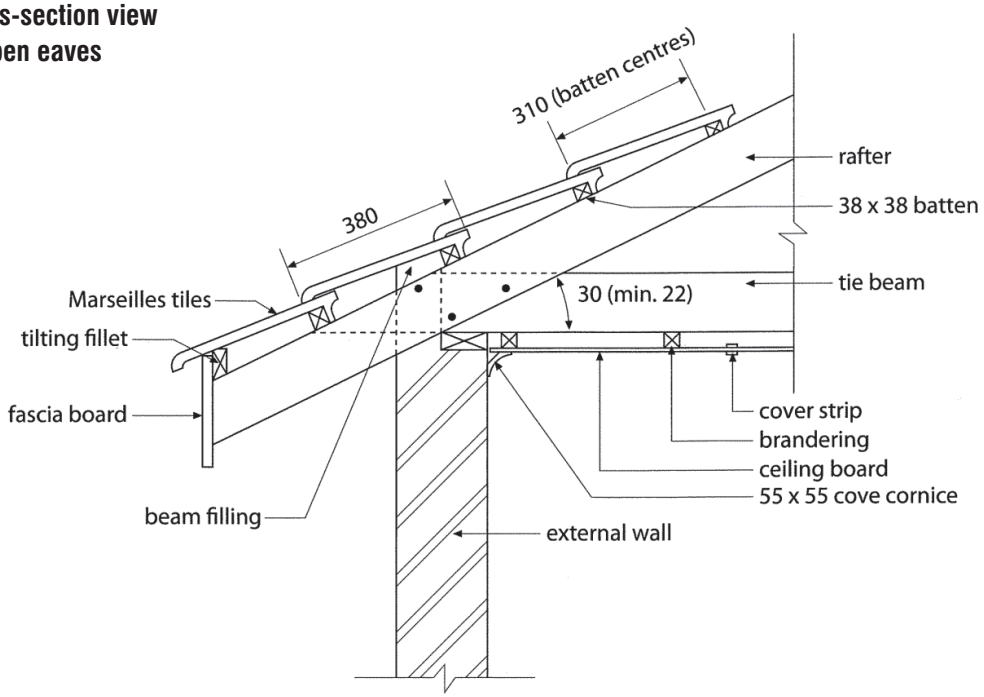
Braced batten | Framed and braced | Stable | Closed back batten

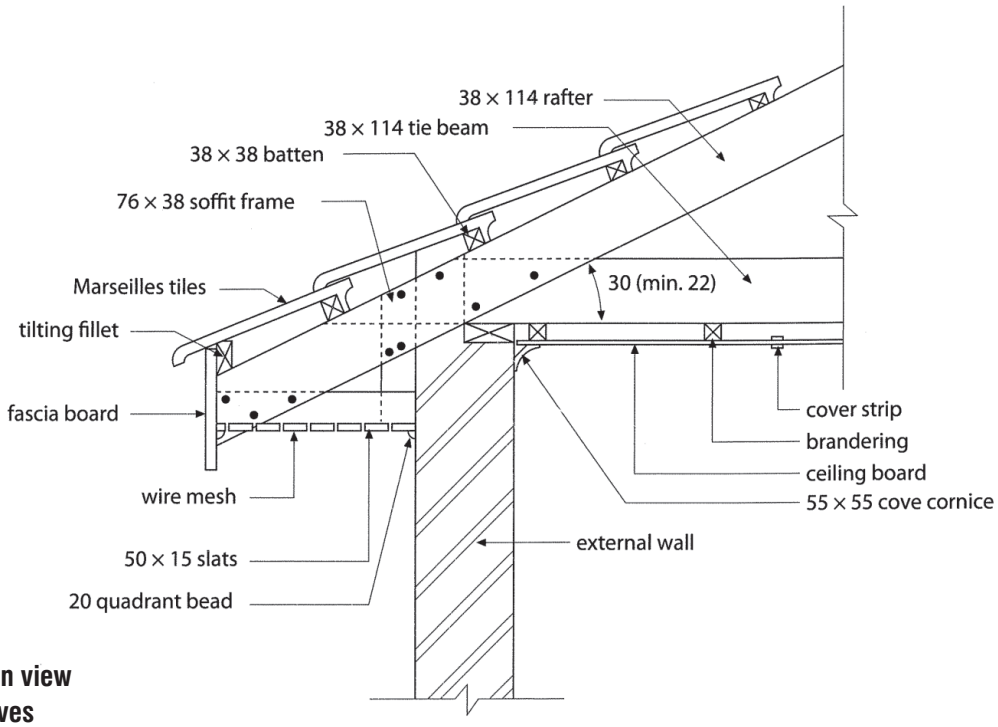


Glazed | Louvered | Wood panelled | Composite

EAVES

Cross-section view of open eaves





Cross-section view of closed eaves

Notes

Quantity Surveying N4 is one of many publications introducing the gateways to Engineering Studies. This course is designed to develop the skills for learners that are studying toward an artisanship in the building and civil construction fields and to assist them to achieve their full potential in an civil engineering career.

This book, with its modular competence-based approach, is aimed at assisting facilitators and learners alike. With its comprehensive understanding of the engineering environment, it assists them to achieve the outcomes set for course.

The subject matter is presented as worked examples in the problem-solving-result methodology sequence, supported by numerous and clear illustrations.

Practical activities are included throughout the book.

The authors are well known and respected in the building and civil construction fields. Their extensive experience gives an excellent base for further study, as well as a broad understanding of civil technology and the knowledge to success.

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