

**AIM:** Bill of quantities

**Objectives:** At the end of the lesson the learners should be able:

- Define a bill of quantities (BQ).
- Produce a bill of quantities for building work sections.

### **Definition**

- A bill of quantities is the final document that is sent out to all companies being invited to tender so that all tender prices are prepared using the same information.

### **Bill of quantities breakdown structure**

There a number of different breakdown structures for a BQ. NRM 2 can be adopted as the rules of measurement for building works irrespective of what BQ breakdown structure is chosen. The main BQ breakdown structures are:

- a. Work section: Measurement and description is divided into the work sections listed in NRM 2.

Work section breakdown structure	
Bill No. 1	Preliminaries
Bill No. 2	Off-site manufactured materials, components or buildings
Bill No. 3	Demolitions
Bill No. 4	Alterations, repairs and conservation
Bill No. 5	Excavating and filling
Bill No. 6	Ground remediation and soil stabilisation
Bill No. 7	Piling
Bill No. 8	Underpinning
Bill No. 9	Diaphragm walls and embedded retaining walls
Bill No. 10	Crib walls, gabions and reinforced earth
Bill No. 11	In-situ concrete works
Bill No. 12	Precast/composite concrete
Bill No. 13	Precast concrete
Bill No. 14	Masonry
Bill No. 15	Structural metalwork
Bill No. 16	Carpentry
Bill No. 17	Sheet roof coverings
Bill No. 18	Tile and slate roof and wall coverings
Bill No. 19	Waterproofing
Bill No. 20	Proprietary walls, linings and partitions
Bill No. 21	Cladding and covering
Bill No. 22	General joinery

Work section breakdown structure	
Bill No. 23	Windows, screens and lights
Bill No. 24	Doors, shutters and hatches
Bill No. 25	Stairs, walkways and balustrades
Bill No. 26	Metalwork
Bill No. 27	Glazing
Bill No. 28	Floor, wall, ceiling and roof finishings
Bill No. 29	Decoration
Bill No. 30	Suspended ceilings
Bill No. 31	Insulation, fire stopping and fire protection
Bill No. 32	Furniture, fittings and equipment
Bill No. 33	Drainage above ground
Bill No. 34	Drainage below ground
Bill No. 35	Site works
Bill No. 36	Fencing
Bill No. 37	Soft landscaping
Bill No. 38	Mechanical services
Bill No. 39	Electrical services
Bill No. 40	Transportation systems
Bill No. 41	Builder's work in connection with mechanical, electrical and transportation installations
Bill No. 42	Risks
Bill No. 43	Provisional sums
Bill No. 44	Credits
Bill No. 45	Daywork (provisional)

Work section BQ breakdown structures for a simple building project

- b. Elemental: Measurement and description is done by group elements and each group element forms a separate section of the BQ, irrespective of the order of work sections in NRM 2. The group elements, elements and sub-elements used are those defined by NRM 1.

Elemental breakdown structure	
Bill No. 1	Preliminaries (main contract)
Bill No. 2	Facilitating works
Bill No. 3	Substructure
Bill No. 4	Superstructure
Bill No. 5	Internal finishes
Bill No. 6	Fittings, furnishings and equipment
Bill No. 7	Services
Bill No. 8	External works
Bill No. 9	Risks
Bill No. 10	Provisional sums
Bill No. 11	Credits
Bill No. 12	Daywork (provisional)

Elemental BQ breakdown structures for a simple building project.

An elemental breakdown structure supports a logical and structured approach to the quantification of a building project. Moreover, this type of breakdown structure makes it easier for the quantity surveyor/cost

manager to analyse a contractor's tender price and collect real-time cost data for future use.

- c. **Work package:** Measurement and description is divided into employer, quantity surveyor/cost manager or contractor defined work packages, whichever is applicable. Works packages can be based on either a specific-trade (e.g. concrete work, brickwork and blockwork, roof coverings, painting and decorating, and wall tiling) or a single package comprising a number of different trades (e.g. a groundworks package might include all excavation and earthworks, below ground drainage and the ground-bearing concrete floor-slab so as to make a single works contractor responsible for the interface between the drainage and the groundbearing concrete floor-slab).

Work section breakdown structure	
Bill No. 1	Contractor's preliminaries
Bill No. 2	Intrusive investigations
Bill No. 3	Demolition works
Bill No. 4	Groundworks
Bill No. 5	Piling
Bill No. 6	Concrete works
Bill No. 7	Roof coverings and roof drainage
Bill No. 8	External and internal structural walls
Bill No. 9	Cladding
Bill No. 10	Windows and external doors
Bill No. 11	Mastic
Bill No. 12	Non-structural walls and partitions
Bill No. 13	Joinery
Bill No. 14	Suspended ceilings
Bill No. 15	Architectural metalwork
Bill No. 16	Tiling
Bill No. 17	Painting and decorating
Bill No. 18	Floor coverings
Bill No. 19	Fittings, furnishings and equipment
Bill No. 20	Combined mechanical and electrical engineering services
Bill No. 21	Lifts and escalators
Bill No. 22	Facade access equipment
Bill No. 23	External works and drainage
Bill No. 24	Risks
Bill No. 25	Provisional sums
Bill No. 26	Credits
Bill No. 27	Daywork (provisional)

Typical BQ breakdown structure for discrete work package

### **Production of a bill of quantities for a building work section**

The bill of quantities is assembled from the direct billing paper or abstract sheets.

## Format and layout

- The bill of quantities is usually a typed document in a tabulated format as shown in figure below, a bill page using section 11 of NRM (Insitu Concrete Works), illustrates.
- The main contractor would fill in the rates and then calculate the total for each item.

Bill No. 1 Substructure of Kitchen Extension						
Ref	Description	Qty	Unit	Rate	£	p
	<b><u>1.11. IN-SITU CONCRETE WORKS</u></b>					
1.11.1	<b><u>In-situ concrete</u></b>					
1.11.1.1	In-situ concrete foundations (Grade C20P) poured on or against the earth.	1	m <sup>3</sup>			
1.11.2	<b><u>Concrete bed</u></b>					
1.11.2.1	Oversite concrete bed <= 300mm thick to be ready mixed concrete, designated mix 20/25, 20 N/mm <sup>2</sup> , 20 mm aggregate.	1	m <sup>3</sup>			
1.11.1.2	20 mm flooring screed > 600 mm wide.	1	m <sup>2</sup>			
	<b><u>To Summary</u></b>				£	

A bill page from NRM.

The last three columns are where the unit rate is written and a subtotal.

Note the following from figure above:

- The items are all referenced with a number/letter down the left-hand side (Column 1)
- Column 2 is the full description of the quantities from the specifications/NRM2.
- Column 3 is the total quantity taken from the abstract sheet or direct billing paper.
- Column 4 is the unit of measurement.
- Column 5 is the unit rate.
- Column 6 is the subtotal.

Each page has a page total which is sent to a collection page, where figures are totalled and carried to a final summary.

### Totalling pages

There are a number of ways in which the quantity surveyor/cost manager might indicate how the cash totals on each page of the bill are to be dealt with. The preferred method is for the total to be carried over to be added to the next page and so on until the end of the bill or subsection of the bill. Unless the bill section comprises only one page, the foot of the first and intermediate bill pages should be completed as follows:

		Carried forward	£		

The top of the following bill page is completed as follows:

BILL 3: SUPERSTRUCTURE					
2.5 EXTERNAL WALLS					
		Brought forward	£		

To end each bill section, the section is completed as follows:

	TOTAL carried to main summary		£		

Refer to 'Bill of Quantities\_Detailed sample' file for alternative way.

## **Self-assessment Task**

Refer to previous self-assessment abstraction tasks and produce accurate bills of quantities for the foundation, ground floor, and roof.



Use the provided 'BOQ Building Extension' template file.