2.3.5 Standards for measurements 1

Key terms

Term	Definition
Rules of measurement	Measurement is the process of transforming drawn information into descriptions and quantities in order to cost and price construction work.
Quantities	Quantities refer to the estimated amount of labour and materials required to complete a building project.
Bill of quantities	This is a detailed statement of work, prices, dimensions, and other details to complete a building project.
Taking off quantities	Taking off is the process of analysing a set of drawings and specifications to identify the materials and labour required to carry out a building project.
Capital building works	A capital building project is one where the total cost of the project will exceed £50,000.

The 'rules of measurement' affecting the planning of construction, installation, and maintenance projects

The New Rules of Measurement (NRM) are published by the Royal Institution of Chartered Surveyors' (RICS) Quantity Surveying and Construction Professional Group.

The RICS new rules of measurement is a suite of documents that have been written to give a standard set of rules that anyone involved in a building project will understand:

- NRM1 – order of cost estimating and cost planning for capital building works.
- NRM2 – detailed measurement for building works.
- NRM3 – order of cost estimating and cost planning for building maintenance works.

NRM1 allows for effective and accurate cost information to be provided to a client and other project team members.

NRM2 gives guidance on how to prepare a bill of quantities.

NRM3 gives directions on how to quantify and describe maintenance works to create an initial estimate of costs.

The rules of measurement for civil engineering projects

The Civil Engineering Standard Method of Measurement (CESMM) is a well-established standard for the preparation of Bills of Quantities in civil engineering work. The current version, version 4, has been updated to incorporate modern construction techniques enabling tenders to be prepared efficiently and accurately.

The CESMM includes 26 main classes of work commonly undertaken as part of a construction project and then divides these classes of work into items. It details the methods for describing items, the units that should be used and the method of measurement for the items. Items include activities such as the following:

- ground investigation
- in situ concrete
- structural metal work
- roads and paving, brickwork, blockwork, and masonry.

Producing quantities for substructures and superstructures

To be able to produce a Bill of Quantities it is necessary to apply the appropriate rules of measurement and the following mathematical techniques:

- Addition, subtraction, multiplication, and division
- Sequences
- Properties of circles
- Area and perimeter formulae for 2D shapes
- Volume and surface area formulae for 3D objects
- Centre line calculations
- Powers, indices, and routes
- Calculating averages (mean).

Addition, subtraction, multiplication, and division

When using the basic mathematical operators, it is important to recall and apply the order of operations given in BIDMAS:

- BRACKETS – any part of a calculation that is in brackets should be completed first.
- INDICES – calculate numbers raised to a power, 4^3.
- DIVISION and MULTIPLICATION – starting from the left, carry out division operations and multiplication operations.
- ADDITION and SUBTRACTION – work from the left and work out in the order they appear.

Example

The maximum bending load of a uniformly distributed load is given by $wL^2/8$.

This can be rewritten as $(w \times L^2) \div 8$ or $(w \times L \times L) \div 8$.

The brackets should be multiplied out first and then divided by eight.