

# CESMM-SA

CIVIL ENGINEERING STANDARD METHOD OF MEASUREMENT

Southern African edition

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**ice**  
Institution of Civil Engineers

**ice-sa**

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# Foreword

The use of bills of quantities on construction contracts permits three important objectives to be achieved, these being the following:

- Tenderers are provided with adequate information regarding the extent of the work required to enable them to accurately and confidently prepare tenders which may readily be compared with other tenders.
- Employers can pre-determine with a high degree of accuracy the costs of contracts and the impact of possible variations to the works.
- A sound basis is provided for the valuation of work carried out at any stage of a contract.

Bills of quantities will more effectively achieve the foregoing objectives if they:

- reflect the nature of the work proposed and the circumstances under which it will be executed;
- are prepared in a standard manner for all contracts; and
- are brief and simple to use while still being itemised in sufficient detail to distinguish between different classes of work, and between work of the same nature carried out in differing circumstances and locations.

The Institution of Civil Engineers (ICE) published a report of a committee dealing with engineering quantities in 1933 which provided a standard procedure for the drafting of bills of quantities for civil engineering work. ICE thereafter published the *Standard Method of Measurement of Civil Engineering Quantities* in 1953. This was reissued with slight amendments in 1963 and a metric edition in 1968.

In 1967 the Construction Industry Research and Information Association (CIRIA) initiated research into improving contract procedure. One of the projects proposed the means of making the information in the bill more useful. CIRIA Report 34 concluded that civil engineering bills of quantities should apart from scheduling the components of the contemplated work, also contain charges related to the method and timing of the contractor's operations. ICE worked on these proposals and published the *Civil Engineering Standard Method of Measurement (CESMM)* in 1976. The principal changes were:

- greater standardization in format;
- the introduction of various levels of classifications or "pigeon holes" from which descriptions could be developed;
- the introduction of a coding arrangement;
- the use of method-related charges to represent more clearly site construction costs such as the cost of setting up and operating equipment, labour teams and the like; and
- a large number of small changes to remove anomalies and differences in interpretation.

The second edition, CESMM2, was published in 1985 to keep pace with new technology, particularly in the site investigation and geotechnical processes, and to secure better compatibility with building measurement practice with the introduction of SMM7, *Standard Method of Measurement of Building Works*<sup>1</sup>. The third edition, CESMM3, was published in 1991 to align the system with the sixth edition of the *ICE Conditions of Contract*.

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<sup>1</sup> Bills of quantities in building works are based on more precise information and details and cover more items than is the case with civil engineering works. Consequently building works are subjected to more detailed measurement. Most building contracts, with the exception of sub-structural drainage and external works, are, in the absence of changes to the scope of work, not subject to remeasurement. In civil engineering contracts, the bills of quantities are regarded as estimates of the work and are as such subject to remeasurement. The alignment of CESMM3 with SMM7, facilitates the measurement of building works in a contract under SMM7 and the civil engineering portion of the contract under CESMM3 e.g. heavy foundations, piling, railway sidings, roads and services.

CESMM3 defines a bill of quantities as “*a list of items giving brief identifying descriptions and estimated quantities of work comprised in the contract*”. Accordingly, the billed items merely identify the work and the person pricing a bill of quantities will have to look at the scope of work (drawings and specifications) and the contract data to obtain most of the information to arrive at a price.

The first South African edition of the *Standard Method of Measurement of Civil Engineering Quantities* was published in 1960 by the South African Institution of Civil Engineers (SAICE), the South African Association of Consulting Engineers (SAACE) and the South African Federation of Civil Engineering Contractors (SAFCEC). This document was based on the 1933 and 1953 editions of the equivalent document published by the Institution of Civil Engineers (London). The first edition was revised in 1969, because of impending metrication and the 1969 edition was revised in 1973 to eliminate certain unsatisfactory features which it contained. A third edition was published in 1979.

*Civil Engineering Quantities 1973: the Standard System of Measurement of Civil Engineering Quantities for South Africa and South West Africa (CEQ73)* used the term Schedule of Quantities as opposed to Bill of Quantities. According to CEQ73, a Schedule of Quantities is “*a list of items giving the estimated quantities and brief descriptions of the work to be performed and materials to be provided under the Contract, the quantities being derived from the drawings and specifications, and space being provided for the insertion of price rates against each item and the extension and totalling of prices*”. CEQ73 makes it clear that the “*Schedule of Quantities should be prepared on the understanding that, in the absence of specific directions to the contrary, the rates and prices that will be inserted will be considered as being the full inclusive rates and prices for the finished work described under the respective items as covering, not only all labour, materials, temporary work, plant, on-cost items and other overhead charges and profit, but also the general liabilities, obligations and risk arising out of the conditions of contract and specification. The contingent and potential causes of expenditure, generally classified as contractors’ risks, (e.g. timbering or side-sloping of excavations) are to be clearly and precisely defined in the conditions of contract specifications, so that they may be properly apportioned to the rates and prices in the Schedule of Quantities*”.

The measurement and payment clauses of SABS 1200 Standardized Specification for Civil Engineering Construction (SABS 1200 series of standardized specifications) which was published in 1979 are based on CEQ73. Guidance on the application of this system was provided in SABS 0120, *Code of Practice for use with Standardized Specifications for Civil Engineering Construction and Contract Documentation*. The measurement and payment clauses of the Committee of Land Transport Officials’ (COLTO) *Standard Specification for Road and Bridge Works for State Road Authorities* built upon and expanded the system of measurement contained in the SABS 1200 series of standardised specifications.

SAICE published *Civil engineering quantities 1990* in 1990 as a successor to the Standard System of Measurement of Civil Engineering Construction Contracts. The need for revising CEQ73 became necessary, as Chapter VII (Units and Methods of Measurement) had been adopted and incorporated into SABS 1200 series of standardised specifications, thus making much of CEQ73 redundant. *Civil Engineering Quantities 1990*:

- incorporated the contents of all the Chapters of CEQ73 other than VII;
- provided a more disciplined approach to the derivation and recording of the quantities; and
- illustrated the inter-relationship of both the taking-off and the schedule of quantities to the SABS 1200 series of standardized specifications read with SABS 0120 and SAICE’s General Conditions of Contract (GCC82).

The Green Paper on Public Sector Procurement Reform in South Africa which was published in 1997 proposed that there should be a *complete separation in contract documentation between conditions of tender, conditions of contract, specifications and terms of payment (including methods of measurement)*. This proposal set the framework for procurement reform in the area of procurement documentation and led to the publication of SANS 10403, *Formatting and compilation of construction procurement*

documents, in 2003<sup>2</sup> and the Construction Industry Development Board's *Standard for Uniformity in Construction Procurement* in 2004. The successor to the SABS series of standardized specifications, namely SANS 1921, *Construction and management requirements for works contracts*, and SANS 2001, *Construction works*, is based on this green paper principle and make no reference to measurement and payment.

What has happened over time is that the principles and thinking behind the current system of measurement that flows out of clause 8 of the SABS 1200 series of standardized specifications has become lost. Consultants and contractors alike are often unaware that the system of measurement and payment contained in the various parts of SABS 1200 needs to be read in conjunction with SABS 0120, SANS 1200 parts A, AA, AD or AH and *Civil Engineering Quantities 1990*<sup>3</sup>.

The logical approach to dealing with the civil engineering quantities in the current changed environment is to have one stand alone document that deals with the standard system of measurement for civil engineering works. This system must be sufficiently flexible to be used with any of the standard forms of contract that are included in the CIDB's *Standard for Uniformity in Construction Procurement* and the range of standard specifications that are currently in use in South Africa. Ideally such a document should be compatible with international practice.

CESMM3 is a logical choice as it is a document founded on the same thinking and philosophy as the system that has evolved in South Africa. It is widely used in Africa and is well understood by the international community. It is a well tried and tested document that is adequately supported by a range of comprehensive handbooks and texts.

This Southern African version of CESSM3, CESSM-SA, is a modified version of the third edition of CESSM3. The modifications to this version of CESSM3 reflects the specific practices and culture of the local industry. The principal differences between the third edition of CESSM3 and the Southern African edition are:

- No reference is made in CESMM-SA to any standard form of Contract as the terms and text are aligned with standard forms of contract commonly in use in the region.

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<sup>2</sup> ISO/FDIS 10845-2, *Construction procurement - Part 2: Formatting and compilation of procurement documentation*, reflects the same approach as that in SANS 10403 and the 2008 edition of the CIDB's *Standard for Uniformity in Construction Procurement*.

<sup>3</sup> All the parts of SABS 1200 include in the supporting specifications a reference to SABS 1200A, SABS 1200AA, SABS 1200AD or SABS 1200 AH. Each of these specifications contain a clause 8.1.1.1 which reads:

***Method of measurement, all Sections of the Schedule***

*Except where otherwise specified in Clause 8 of the standardized specifications or in the project specifications or in the preamble to the schedule, all items in the schedule shall be measured and shall cover the operations as recommended in the standard system of measurement of civil engineering quantities for South Africa and South West Africa, published under the title civil engineering quantities, as approved and recommended for general use by the South African Institution of Civil Engineers, the South African Association of Consulting Engineers and the South African Federation of Civil Engineering Contractors.*

The standard wording to clause 1.1.3 of the Preamble to the Schedule of Quantities in SABS 0120:Part 4 (1982) reads as follows:

*Descriptions in the schedule of quantities are abbreviated and the schedule has been drawn up generally in accordance with the latest issue of Civil engineering quantities. Should any requirement of the measurement and payment clause of the applicable standardized specifications, or the project specifications, or particular specifications conflict with the terms of the schedule or, when relevant civil engineering quantities, the requirements of the standardised, project, or particular specification, as applicable, shall prevail.*

- The terminology in CESMM-SA is aligned with the provisions of ISO 10845-2, *Construction procurement - Part 2: Formatting and compilation of procurement documentation*, and South African national standards or international standards.

**Dr Ron Watermeyer**, FSAICE, FStructE, FICE

**Chairman: ice-sa**

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**Contributors and reviewers**

(To be completed)

*Draft for comment*

## **SECTION 1. DEFINITIONS**

**1.1** In this document and in Bills of Quantities prepared according to the procedure set forth herein the following words and expressions have the meanings hereby assigned to them, except where the context of the Conditions of Contract otherwise requires:

**1.1.1** 'Adjustment Item' means the lump sum addition or deduction made by the tenderer to adjust the total of the priced Bill of Quantities

**1.1.2** 'Bill of Quantities' means a document that lists the items of work, the quantities and rates associated with each item to allow contractors to be paid at regular intervals an amount equal to the agreed rate for the work multiplied by the quantity of work completed

**1.1.3** 'Commencing Surface' means, in relation to an item in a Bill of Quantities, the surface of the ground before any work covered by the item has been carried out. 'Commencing Surface' means, in relation to a group of items in a Bill of Quantities for work in different materials in an excavation or a bored drilled or driven hole, the surface of the ground before any work covered by any item in the group has been carried out.

**1.1.4** 'Completion' means a state of readiness for occupation or use of the whole works although some minor work may be outstanding

**1.1.5** 'Conditions of Contract' means terms that collectively describe the rights and obligations of contracting parties and the agreed procedures for the administration of their contract; or document containing conditions of contract

**1.1.6** 'Contract' means a legally enforceable agreement to supply goods, execute work or provide services.

**1.1.7** 'Contract Data' means the document that identifies the applicable Conditions of Contract and states the associated contract-specific data

**1.1.8** 'Contract Price' means the sum to be ascertained and paid in accordance with the provisions for the construction and completion of the Works in accordance with the Contract

**1.1.9** 'Contractor' means the person or organization that contracts to provide the goods, services or engineering and construction works covered by the Contract

**1.1.10** 'Daywork' means the method of valuing work on the basis of time spent by the workmen, the materials used and the equipment employed.

**1.1.11** 'Drawings' means information for the Works issued to the Contractor which is issued in terms of the Contract in a graphical form

**1.1.11** 'Employer' means the person or organization that enters into a contract with a Contractor to provide the goods, services or engineering and construction works covered by the Contract

**1.1.12** 'Excavated Surface' means

- a) in relation to an item in a Bill of Quantities, the surface to which excavation included in the work covered by the item is to be carried out; and
- b) in relation to a group of items in a Bill of Quantities for excavation in different materials, the surface to which excavation included in the work covered by any item in the group is to be carried out.

**1.1.13** 'Final Surface' means the surface indicated on the Drawings to which excavation is to be carried out.

**1.1.14** 'Fixed Charge' means a Method-Related Charge which is not a Time-Related Charge.

**1.1.15** 'Method-Related Charge' means the sum for an item inserted in the Bill of Quantities by a tenderer in accordance with paragraph 7.1

**1.1.16** 'Nominated Sub-contractor' means the person or organisation nominated in accordance with the Contract to be employed by the Contractor to provide the nominated goods, services or engineering construction works or ordered by the person who is authorized in terms of the Contract to change the Scope of Work.

**1.1.17** 'Original Surface' means the surface of the ground before any work has been carried out.

**1.1.18** 'Permanent Works' means the works other than Temporary Works to be constructed and completed in accordance with the Contract.

**1.1.19** 'Price Adjustment Formula' means a specific method of calculating the amount to be added to or deducted from the Contract Price by way of allowances for increases or decreases in the costs of labour, plant and materials occurring during the currency of the Contract using a price variation formula.

**1.1.20** 'Pricing Assumptions' means the document that provides the criteria and assumptions which are assumed in the Contract, that the tenderer has taken into account when developing his prices, or target, in the case of target cost contracts

**1.1.21** 'Prime Cost (PC) Item' means an amount included in a Contract for work or services to be executed by a Nominated Sub-contractor or for materials or goods to be obtained by or from a nominated supplier.

**1.1.22** 'Provisional Sum' means

- a) an amount included in a Contract for work that is foreseen but cannot be accurately specified at the time the tender documents are issued, or.
- b) a sum included and so designated in the Contract as a specific contingency for the execution of the work or the supply of goods materials or services which may be used in whole or in part or not all at the direction and discretion of the person who is authorized in terms of the Contract to change the Scope of Work.

**1.1.23** 'Scope of work' means the document that specifies and describes the goods, services, or engineering and construction works which are to be provided and any other requirements and constraints relating to the manner in which the Contract work is to be performed and which may be amended from time to time in terms of the Contract

**1.1.24** 'Selected Sub-contractor' means a sub-contractor who is appointed in terms of a procedure provided in the Scope of Work after the award of the Contract.

**1.1.25** 'Site' means the lands and other places on, under in or through which Works are to be executed and any other lands or places provided by the Employer for such purposes

**1.1.26** 'Standard' means a document, established by consensus and approved by a national standards body or an international standards organisation, that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context,

**1.1.27** 'Temporary Works' means all temporary works of every kind required on site for the execution and completion of the Permanent Works and the remedying of any defects

**1.1.28** 'Tender Total' means the total of the Bill of Quantities at the date of award of the Contract.

**1.1.29** 'Time-Related Charge' means a Method- Related Charge for work the cost of which is to be considered as proportional to the length of time taken to executed the work.

**1.1.30** 'Work Classification' means the Work Classification set out in section 8.

**1.1.31** 'Works' means the provision of Permanent Works together with the Temporary Works.

**1.2** The word 'work' includes work to be carried out, goods, materials and services to be supplied, and the liabilities, obligations and risks to be undertaken by the Contractor under the Contract.

**1.3** The expression 'expressly required' means described in the Scope of Work or instructed in terms of the Contract which modify the contents of the Scope of Work.

**1.4** A hyphen between two dimensions means a range of dimensions which includes all dimensions **equal to or** exceeding that preceding the hyphen but not exceeding that following the hyphen.

**1.5** 'SANS' means South African National Standard or an equivalent national or international standard.

## SECTION 2. GENERAL PRINCIPLES

### Title application and extent

**2.1** The title of this document is the *Civil Engineering Standard Method of Measurement*, Southern African edition, which is abbreviated to CESMM-SA. CESMM-SA is intended to be used in conjunction with a range of Conditions of Contract and only in connection with civil engineering works and simple building works incidental to civil engineering works.

**2.2** CESMM-SA provides for simple building works incidental to civil engineering works to be measured in accordance with class Z. CESMM-SA does not deal with the preparation of Bills of Quantities for mechanical or electrical engineering work, or complex building work or work which is seldom encountered in civil engineering contracts. Where any such work is to be included in a Contract for civil engineering work, it shall be itemized and described in the Bill of Quantities in sufficient detail to enable tenderers to price it adequately and the method of measurement shall be stated in the Pricing Assumptions in the Pricing Data (see ISO 10845-2) in accordance with paragraph 5.4.

### Object of CESMM-SA

**2.3** The object of CESMM-SA is to set forth the procedure according to which the Bill of Quantities shall be prepared and priced and the quantities of work expressed and measured.

### Objects of the Bill of Quantities

**2.4** The objects of the Bill of Quantities are

- (a) to provide such information of the quantities of work as to enable tenders to be prepared efficiently and accurately.
- (b) when a Contract has been entered into, to provide for use of

the priced Bill of Quantities in the valuation of work executed.

**2.5** In order to attain these objects, work should be itemized in the Bill of Quantities in sufficient detail for it to be possible to distinguish between the different classes of work, and between work of the same nature carried out in different locations or in any other circumstances which may give rise to different considerations of cost. Consistent with these requirements the layout and content of the Bill of Quantities should be as simple and brief as possible.

**2.6** All work which is expressly required should be covered in the Bill of Quantities.

**2.7** CESMM-SA seeks to attain these objects principally by the use of the Work Classification. This defines

- (a) how work is to be divided into separate items in the Bill of Quantities
- (b) the information to be given in item descriptions
- (c) the units in which the quantities against each item are to be expressed
- (d) how the work is to be measured for the purpose of calculating quantities.

## SECTION 3. APPLICATION OF THE WORK CLASSIFICATION

### Item descriptions

**3.1** The Work Classification divides work commonly encountered in civil engineering contracts into 26 main classes. Each class comprises up to three divisions which classify work at successive levels of detail. Each division comprises a list of up to eight descriptive features of work. Each item description in the Bill of Quantities shall identify the component of work covered with respect to one feature from each division of the relevant class, e.g.

Class H (precast concrete) contains three divisions of classifications. The first classifies different types of precast concrete units, the second classifies different units by their dimensions, and the third classifies them by their mass. Each item description for precast concrete units shall therefore identify the component of work in terms of the type of unit, its dimensions and mass.

### Mode of description

**3.2** To avoid unnecessary length, item descriptions for Permanent Works shall generally identify the component of the Works and not the tasks to be carried out by the Contractor, e.g.

An item should be described as 'Mild steel bar reinforcement to SANS 920 nominal size 20 mm', not as 'Supply, deliver, cut, bend and fix plain round mild steel bar reinforcement to SANS 920 nominal size 20 mm'.

**3.3** Where the work identified by an item is specifically limited, the limitation shall be stated in the item description, e.g.

'Mild steel bar reinforcement to SANS 920 nominal size 20 mm excluding supply and delivery to the Site.'

Item descriptions for work which is divided between two classes require such limitations to be stated, e.g.

Item descriptions for miscellaneous metalwork inserts which are to be cast into concrete require appropriate additional description if items are given in both class G for casting in the inserts and class N for supplying the inserts.

### Separate items

**3.4** The work shall be divided into items in the Bill of Quantities so that the component of work which is included in each item does not exhibit more than one feature from each division of any one class of the Work Classification, e.g.

One item for precast concrete work shall not include more than one of the types of concrete unit listed in the first division of class H, neither shall it include different units whose dimensions are not within one of the classifications listed in the second division of class H, nor shall it include different units whose mass does not lie within one of the ranges listed in the third division of class H.

<b>Units of measurement</b>	<b>3.5</b> The unit of measurement for each item shall be that stated for the item in the Work Classification. The unit of measurement stated against a descriptive feature in the Work Classification shall apply to all items to which that descriptive feature applies.
<b>Measurement rules</b>	<b>3.6</b> Measurement rules in the Work Classification set out the conditions under which work shall be measured and the method by which the quantities shall be computed if other than in accordance with paragraph 5.9.
<b>Definition rules</b>	<b>3.7</b> Definition rules in the Work Classification define the extent and limits of the class of work represented by a word or expression used in the Work Classification and in a Bill of Quantities prepared in accordance with CESMM-SA.
<b>Coverage rules</b>	<b>3.8</b> Coverage rules in the Work Classification provide that the work stated is deemed to be included in the appropriate items to the extent that such work is included in the Contract. A coverage rule does not state all the work covered by an item and does not preclude any of the work stated being covered by a Method-Related Charge.
<b>Additional description rules</b>	<p><b>3.9</b> Description of an item in addition to that required in accordance with paragraph 3.1 shall be given where required by any provision of section 5 or by any applicable additional description rule in the Work Classification. Where additional description is given, a separate item shall be given for each component of work exhibiting a different additional feature, e.g.</p> <p style="padding-left: 40px;">Additional description rule A1 of class H requires that the specification of the concrete in each precast concrete unit shall be stated. Accordingly, this rule also means that separate items shall be given for units cast from concrete of different specifications.</p> <p><b>3.10</b> Where a descriptive feature in the Work Classification identifies a range or group of dimensions and an applicable additional description rule requires the particular dimension to be stated, the range or group of dimensions shall not also be stated, e.g.</p> <p style="padding-left: 40px;">Additional description rule A2 of class I requires that the nominal bores of pipes shall be stated in item descriptions. The range of nominal bore taken from the second division of the classification of class I shall not also be stated.</p>
<b>Applicability of rules</b>	<b>3.11</b> Rules printed on a right-hand page above a double line apply to all work in the class. Other rules on a right-hand page apply to particular groups of items as shown by the classification table.

## SECTION 4. CODING AND NUMBERING OF ITEMS

### Coding

**4.1** For convenience of reference each item in the Work Classification has been assigned a code number consisting of a letter and not more than three digits. The letter corresponds to the class in the Work Classification in which the item occurs and the digits give the position of the item in the first, second and third divisions of the class, e.g.

Code H 1 3 6 identifies an item as		
class	H	precast concrete
first division	1	beams
second division	3	length 7-10 m
third division	6	mass 5-10 t

**4.2** The symbol \* is used in the rules to the Work Classification to indicate all numbers in the appropriate division, e.g.

H 1 3 \* means the group of code numbers from H 1 3 1 to H 1 3 8 inclusive.

### Item numbers

**4.3** Code numbers may be used to number the items in the Bill of Quantities, the items within the Bill of Quantities being listed in order of ascending code number.

**4.4** Code numbers used as item numbers in the Bill of Quantities shall not form part of the item descriptions or be taken into account in the interpretation of the Contract.

### Coding of unclassified

**4.5** Where a feature of an item is not listed in the Work Classification the digit 9 shall be used in the appropriate positions in the code number.

**4.6** Where there is an item to which a division of classification does not apply or for which fewer than three divisions of classification are given the digit 0 shall be used in the appropriate positions in the code number.

### Numbering of items with additional description

**4.7** Additional description given for an item in accordance with paragraph 3.9 is not represented by the code number. Where code numbers are used as item numbers a suffix number shall be used to distinguish items which have the same code number but different additional description, e.g.

Additional description rule A1 of class H requires that additional description be given for precast concrete units stating their position in the Works and the specification of the concrete used. If three items are required within one part of the Bill of Quantities to allow for precast concrete beams having the same code but different additional description, the items should be numbered.

H 1 3 6.1  
H 1 3 6.2  
H 1 3 6.3

## SECTION 5. PREPARATION OF THE BILL OF QUANTITIES

<b>Measurement of completed work</b>	<b>5.1</b> Appropriate provisions of this section shall also apply to the measurement of completed work.
<b>Sections of the Bill of Quantities</b>	<p><b>5.2</b> The Bill of Quantities shall be divided into the following sections.</p> <p>(a) Daywork Schedule, if applicable  (b) Work items (grouped into parts)  (c) Grand Summary.</p>
<b>List of principal quantities</b>	<b>5.3</b> A list of the principal components of the Works with their approximate estimated quantities shall be given solely to assist tenderers in making a rapid assessment of the general scale and character of the proposed Works prior to the examination of the remainder of the Bill of Quantities and the other contractual documents on which their tenders will be based.
<b>Pricing assumptions</b>	<p><b>5.4</b> The Pricing Assumptions (see ISO 10845-2) shall state the methods of measurement other than CESMM-SA, if any, which have been adopted in the preparation of the Bill of Quantities and are to be used for the measurement of any part of the Works. Such methods of measurement shall comprise those adopted and to be used for any work not covered by CESMM-SA and any amendments to CESMM-SA which have been adopted and are to be used. Amendments comprising abbreviation of CESMM-SA are usually necessary for Contractor-designed work and work which is intended to involve selection between alternatives at the discretion of the Contractor. The extent of the work affected by all amendments to CESMM-SA shall be stated in the Pricing Assumptions.</p> <p><b>5.5</b> Where excavation, boring or driving is included in the work a definition of rock shall be given in the Pricing Assumptions and this definition shall be used for the purpose of measurement.</p> <p><b>5.6</b> The Pricing Assumptions shall state any provision or establish any conditions relating to Dayworks and the measurement thereof.</p>
<b>Daywork Schedule</b>	<p><b>5.7</b> The Daywork Schedule, if any, shall comprise a list of the various classes of labour, materials and equipment for which Daywork rates or prices are to be inserted by the tenderer.</p> <p><b>5.8</b> Provisional Sums for work executed on a Daywork basis may be given comprising separate items for labour, materials, equipment and supplementary charges.</p>
<b>Work items</b>	<b>5.9</b> The items in the Bill of Quantities which are to be priced

*Division of the Bill of Quantities into parts*

and to contribute to the Tender Total may be arranged into numbered parts to distinguish between those parts of the work of which the nature, location, access, limitation on sequence or timing or any other special characteristic is thought likely to give rise to different methods of construction or considerations of cost. General items (class A) may be grouped as a separate part of the Bill of Quantities. Items in each part shall be arranged in the general order of the Work Classification.

*Headings and sub-headings*

**5.10** Each part of the Bill of Quantities shall be given a heading and groups of items within each part be given sub-headings. Headings and sub-headings shall be read as part of the item descriptions to which they apply. A line shall be drawn across the item description column below the last item to which each heading or sub-heading applies. Headings and sub-headings shall be repeated at the start of each new page which lists items to which they apply.

*Extent of itemization and description*

**5.11** All work shall be itemized and the items shall be described in accordance with the Work Classification, but further itemization and additional description may be provided if the nature, location, importance or any other special characteristic of the work is thought likely to give rise to special methods of construction or considerations of cost.

*Descriptions*

**5.12** Descriptions shall identify the work covered by the respective items, but the exact nature and extent of the work is to be ascertained from the Scope of Work and Contract Data, as the case may be, read in conjunction with the Work Classification.

**5.13** Any detail of description required to be given in accordance with the Work Classification may be omitted from an item description provided that a reference is given in its place which identifies precisely where the omitted information may be found in the Scope of Work.

**5.14** Where an item description compiled in accordance with the Work Classification would be insufficient to identify clearly the particular work covered by the item additional description shall be given to identify the work by reference to its location or other physical features shown in the Scope of Work.

*Ranges of dimensions*

**5.15** Where all the components of work included in an item are of one dimension within a range given in the Work Classification that dimension may be stated in the item description in place of the range of dimensions given.

*Prime Cost Items*

**5.16** The estimated price of work to be carried out by a Nominated Sub-contractor or Selected Sub-contractor shall be given in the Bill of Quantities as a Prime Cost Item. Each Prime Cost Item shall be followed by

- (a) an item for a sum for labours in connection therewith which, in the absence of any express provision in the Contract to the contrary, shall include only

- (i) in any case in which the Nominated Sub-contractor or Selected Sub-contractor is to carry out work on the Site for allowing him to use temporary roads, scaffolding, hoists, messrooms, sanitary accommodation and welfare facilities which are provided by the Contractor for his own use and for providing space for office accommodation and storage of plant and materials, for disposing of rubbish and for providing light and water for the work of the Nominated Sub-contractor or Selected Sub-contractor, and
  - (ii) in any case in which the Nominated Sub-contractor or Selected -Subcontractor is not to carry out work on the Site for unloading, storing and hoisting materials supplied by him and returning packing materials, and
- (b) an item expressed as a percentage of the price of the Prime Cost Item in respect of all other charges and profit.

**5.17** Where any goods, materials or services supplied by a Nominate Sub-contractor or Selected Sub-contractor are to be used by the Contractor in connection with any item, reference shall be made in the description of that item, or in the appropriate heading or sub-heading, to the Prime Cost Item under which the goods or materials or services are to be supplied.

*Provisional Sums*

**5.18** Provision for contingencies shall be made by giving Provisional Sums in the Bill of Quantities and not by increasing the quantities beyond those of the work expected to be required. Provisional Sums for specific contingencies shall be given in the general items of the Bill of Quantities. A Provisional Sum for a general contingency allowance if required, shall be given in the Grand Summary in accordance with paragraph 5.26.

*Quantities*

**5.19** The quantities shall be computed net using dimensions from the Drawings, unless directed otherwise by a measurement rule in CESMM-SA or by the Contract, and no allowance shall be made for bulking, shrinkage or waste. Quantities may be rounded up or down where appropriate. Fractional quantities are not generally necessary and should not be given to more than one place of decimals.

*Units of measurement*

**5.20** The following units of measurement and abbreviations shall be used.

Unit	Abbreviation
Millimetre	mm
Metre	m
Square millimetre	mm <sup>2</sup> or mm <sup>3</sup>
Square metre	m <sup>2</sup> or m <sup>2</sup>
Hectare	ha

Cubic metre	m <sup>3</sup> or m3
Kilogramme	kg
Ton	t
Sum	sum
Number	nr
Hour	h
Week	wk

*Work affected by water*

**5.21** Where an existing body of open water (other than groundwater) such as a river, stream, canal, lake or body of tidal water is either on the Site or bounds the Site, each body of water shall be identified in the Pricing Assumptions. A reference shall also be given to a drawing indicating the boundaries and surface level of each body of water or, where the boundaries and surface levels fluctuate, their anticipated ranges of fluctuation.

*Ground and excavation levels*

**5.22** The Commencing Surface shall be identified in the description of each item for work involving excavation, boring or driving for which the Commencing Surface is not the Original Surface. The Excavated Surface shall be identified in the description of each item for work involving excavation for which the Excavated Surface is not the Final Surface. The depths of excavation stated in accordance with the Work Classification shall be measured from the Commencing Surface to the Excavated Surface.

*Form and setting*

**5.23** The Bill of Quantities should be set out on paper of A4 size. The work items should be set out within columns headed and ruled consecutively as follows.

<i>Column heading</i>	<i>Column width</i>
Number	20 mm
Item description	90 mm
Unit	10 mm
Quantity	20 mm
Rate	20 mm
Amount:	20 mm plus 8mm

**5.24** Provision shall be made for the amounts inserted on each page to be totalled and carried to a summary of each part of the Bill of Quantities and for the total of each Part Summary to be carried to the Grand Summary.

**Grand Summary**

**5.25** The Grand Summary shall contain a tabulation of the parts of the Bill of Quantities with provision for insertion of the total of the amounts brought forward from the Part Summaries.

*General Contingency Allowance*

**5.26** A Provisional Sum for a general contingency (the General Contingency Allowance), if required, shall be given in the Grand Summary following the total of the amounts brought forward from the Part Summaries.

*Adjustment Item*

**5.27** An item described as the Adjustment Item shall be given in the Grand Summary following the total of the amounts

brought forward from the Part Summaries and the General Contingency Allowance, if any (see paragraphs 6.3, 6.4 and 6.5)

*Total of the Priced Bill of Quantities*

**5.28** Provision shall be made for insertion of the total of the amounts brought forward from the Part Summaries, the amount of the General Contingency Allowance, if any, and the amount of the Adjustment Item.

Draft for comment

## **SECTION 6. COMPLETION, PRICING AND USE OF THE BILL OF QUANTITIES**

- Insertion of rates and prices**      **6.1** Rates and prices shall be inserted in the rate column of the Bill of Quantities in currency of the Contract, expressed if necessary as decimal fractions of the monetary unit.
- Parts to be totaled**                      **6.2** Each part of the Bill of Quantities shall be totaled and the totals carried to the Grand Summary.
- Adjustment Item**                              **6.3** A tenderer may insert a lump sum addition or deduction against the Adjustment Item given in the Grand Summary in adjustment of the total of the priced Bill of Quantities.
- 6.4** For the purposes of interim payments additions or deductions on account of the amount, if any, of the Adjustment Item shall be made by instalments in interim certificates in the proportion that the certified amount bears to the total of the priced Bill of Quantities before the addition or deduction of the amount of the Adjustment Item. Such interim additions or deductions shall be made before deduction of the retention moneys, and shall not exceed in the aggregate the amount of the Adjustment Item. If by the date of issue of a certificate certifying that the works have reached completion, any balance of the amount of the Adjustment Item is outstanding it shall be added to or deducted from the moneys then due.
- 6.5** Account of any addition or deduction to the amounts due to the Contractor in respect of the Adjustment Item shall be taken when applying any Price Adjustment Formula provided for in the Contract.

## SECTION 7. METHOD-RELATED CHARGES

<b>Insertion by a tenderer</b>	<b>7.1</b> A tenderer may insert in the Bill of Quantities such items for Method-Related Charges as he may decide to cover items of work relating to his intended method of executing the Works, the costs of which are not to be considered as proportional to the quantities of the other items and for which he has not allowed in the rates and prices for the other items.
<b>Itemization</b>	<b>7.2</b> Where possible the itemization of Method-Related Charges should follow the order of classification and the other requirements set out in class A of the Work Classification, distinguishing between Time-Related Charges and Fixed Charges. Method-Related Charges may be inserted to cover items of work other than those set out in class A.
<b>Description</b>	<b>7.3</b> Each item for a Method-Related Charge inserted in the Bill of Quantities shall be fully described so as to define precisely the extent of the work covered and to identify the resources to be used and the particular items of Permanent Works or Temporary Works, if any, to which the item relates.
<b>Contractor not bound to adopt method</b>	<b>7.4</b> The insertion by the Contractor of an item for a Method-Related Charge in the Bill of Quantities when tendering shall not bind him to adopt the method stated in the item description in executing the Works.
<b>Charges not to be measured</b>	<b>7.5</b> Method-Related Charges are not subject to any adjustment.
<b>Payment when method not adopted</b>	<b>7.6</b> In the event of the satisfactory execution of any part of the Works which has been the subject of an item for a Method-Related Charge using, whether in whole or in part, a method other than that described in the item the Contractor shall nevertheless be entitled to payment of the Method-Related Charge or the balance thereof. The amount of a Method-Related Charge shall be neither increased nor decreased by reason only of any change in method made by the Contractor, unless such change has instructed in terms of the Contract.

## SECTION 8. WORK CLASSIFICATION

<b>Class A:</b>	<b>General items</b>	<b>16</b>
<b>Class B:</b>	<b>Ground investigation</b>	<b>20</b>
<b>Class C:</b>	<b>Geotechnical and other specialist processes</b>	<b>28</b>
<b>Class D:</b>	<b>Demolition and site clearance</b>	<b>32</b>
<b>Class E:</b>	<b>Earthworks</b>	<b>34</b>
<b>Class F:</b>	<b>In situ concrete</b>	<b>40</b>
<b>Class G:</b>	<b>Concrete ancillaries</b>	<b>42</b>
<b>Class H:</b>	<b>Precast concrete</b>	<b>46</b>
<b>Class I:</b>	<b>Pipework-pipes</b>	<b>48</b>
<b>Class J:</b>	<b>Pipework-fittings and valves</b>	<b>50</b>
<b>Class K:</b>	<b>Pipework-manholes and pipework ancillaries</b>	<b>52</b>
<b>Class L:</b>	<b>Pipework-supports and protection, ancillaries to laying and excavation</b>	<b>56</b>
<b>Class M:</b>	<b>Structural metalwork</b>	<b>60</b>
<b>Class N:</b>	<b>Miscellaneous metalwork</b>	<b>62</b>
<b>Class O:</b>	<b>Timber</b>	<b>64</b>
<b>Class P:</b>	<b>Piles</b>	<b>66</b>
<b>Class Q:</b>	<b>Piling ancillaries</b>	<b>70</b>
<b>Class R:</b>	<b>Roads and pavings</b>	<b>74</b>
<b>Class S:</b>	<b>Rail track</b>	<b>78</b>
<b>Class T:</b>	<b>Tunnels</b>	<b>82</b>
<b>Class U:</b>	<b>Brickwork, blockwork and masonry</b>	<b>88</b>
<b>Class V:</b>	<b>Painting</b>	<b>90</b>
<b>Class W:</b>	<b>Waterproofing</b>	<b>92</b>
<b>Class X:</b>	<b>Miscellaneous work</b>	<b>94</b>
<b>Class Y:</b>	<b>Sewer and water main renovation and ancillary works</b>	<b>96</b>
<b>Class Z:</b>	<b>Simple building works incidental to civil engineering works</b>	<b>102</b>