The Civil Engineering Standard Method of Measurement 1976

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In a separate paper prepared some months before the publication of the CESMM, I set out what seemed to me to be the criteria by which a standard method of measurement should be judged. Such judgement should not be solely subjective but based on some working, practical hypothesis which is soundly based in law.

The following is a summary of the conclusions set out in that paper:—

Definition – the Conditions of Contract in most common use define the M of M as:

(a) a statement of principles (JCT (RIBA) Clause 12 (1));

(b) a statement of procedure (ICE Clause 57).

Status

(a) as a precontract document it is a code of practice and as such can only operate through the Bill of Quantities; it has no legal standing if the bill is clear and unambiguous;

(b) as a post contract document it has a legal status as an appeal document in case of doubt or ambiguity in bill descriptions.

Functions

(a) standardising the system of sub-dividing construction into component parts;

(b) defining the item content;

(c) defining items of temporary work required to be itemised;

(d) indicating circumstances affecting cost significantly;

(e) prescribing the method of ascertaining dimensions and calculating quantities.

Constraints

(a) to provide a language common to contracting firms generally to permit competitive tendering;

(b) to identify components of construction in such a way that they may provide the basis for accumulating historic data;

(c) to permit operation as between employer/contractor and contractor/sub-contractor to allow freedom of decision for contractor as to whether work is executed direct or by sub-contract.

Before considering the status and functions of the CESMM, perhaps comment should first be made on the object and status of the Bill of Quantities. In the Foreword it is said:

> "A Bill of Quantities which in essence is no more than a price list of the Permanent Works no longer adequately reflects the many variables in the cost. . . ."

It is not true that Bills of Quantities (in the last quarter century at least) have been no more than that. The measurement of temporary works has at times infringed too much on method and the separation of time related from quantity related charges has been done for a long time. In the definitions (1.7) it is said:

> "Bill of Quantities means a list of items giving brief identifying descriptions and estimated quantities".

It does not say, as it should, that the extent of the requirement of the items individually and collectively should be clearly apparent and that brevity must be subordinated to this if necessary. The objects of the Bill of Quantities set out in para. 2.4 are unexceptionable and the statement in para. 2.5 that

> ". . . work should be itemised 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"

is most important and cannot be over-emphasised. It is a pity that it should have been thought necessary to repeat the reference to brevity. "Simple" is not to be confused with "unequivocal".

In the following paragraphs, the new CESMM is examined by reference to the foregoing criteria.

Definition

The object of the CESMM is stated in para. 2.3 to be:

> "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".

This accords with Clause 57 of the Conditions of Contract but the CESMM does not in fact set forth anything about pricing – nor can it do so. It can condition Bill of Quantities items so that their scope and extent is clear and it should be possible to presume that the price covers that requirement but beyond that is a matter for construing each item together with its price.

It is perhaps open to question as to whether by adopting an apparently rigid format consisting of definitive details, the essential principles tend to be submerged. It has to be borne in mind that methods of measurement have to be applied to a wide variety of work in widely differing circumstances in which the detailed division and sub-division may not be suitable and it would have been better if the principles underlying the segregation of the various components had been given more prominence.

Status

The object stated is solely pre-contract, so that by definition the status of the CESMM is a code of practice. This represents perhaps the major part of its potential usage but its post contract role, when it can assume contractual status, should not be overlooked and certainly not prejudiced. Here again, too great a preoccupation with detail at the expense of principles may reduce its effectiveness in the important role of providing a contractual reference document to resolve doubts and ambiguities in Bill of Quantities items.

It must be borne in mind that the Bill of Quantities is a contract document and that if its terms are clear and unambiguous then its particular terms must prevail against the generality of the Method of Measurement. If it is in fact unequivocal then if it differed from the CESMM it would in all probability be construed as coming within the exception stated at the opening of Clause 57, namely:

> "Except where any statement or general or detailed description of the work in the Bill of Quantities expressly shows to the contrary. . . ."

Notice that where a detailed description "expressly shows", a separate statement external to the description is not a pre-requisite (though it might be a convenience if it were there) nor is a statement within the item, for the clause says "expressly shows" not expressly states. Indeed this is the only practical application possible.

It is unfortunate that anything within the CESMM should give rise to any doubt about the post-contract role, to which end principles should be stated clearly and unequivocally. In this connection para. 2.5 is reasonably definite. But, in paras. 5.8 and 5.10, the position is seriously weakened by referring to:

> ". . . special characteristics is *thought likely* to give rise to different (special) methods of construction or considerations of cost."

The matter is not helped by being referred to in Class F, Note 2 (but not elsewhere) and even then in the permissive sense of "location . . . *may* be stated". From the point of view of preparing a bill, clearly it is the person doing it who may "think it likely" but from a post-contract point of view, the phrase poses the question as to "in whose opinion". What is the position if a contractor contends that certain work should have been measured separately because of considerations of method or cost? Would a rejoinder that the Engineer had not thought it likely be sufficient or indeed fair defence? From the point of view of appealing to a reference document to resolve an ambiguity, it would have been much less equivocal had the paragraphs been worded ". . . characteristic . . . giving rise to different methods of construction or consideration of cost". It is the more unfortunate that this ambiguity arises in connection with characteristics such as location, access, timing, etc., which give rise to so very much difficulty in preparing bills, in pricing them and in subsequent claims. In this one connection at least the old ICESMM (Clause 11) was unequivocal in saying "Opportunity is to be afforded . . ." and "Sub-division . . . is . . . to be sufficient. . . .".

Functions

Standardising sub-division into components

The work classification is divided into 24 classes (see para. 3.1) which in the main follow general practice, but five of them are quite artificial and one wonders why they have been separated, for they appear to offer no usefulness to estimators or other users of Bills of Quantities.

This paragraph also says each class comprises up to three divisions but this is in fact not true as some of the paragraphs of Section 5 and many of the Notes to the Work Classification in effect set up additional divisions. Further, each division is said to comprise up to eight descriptive features but again this is not true for in many cases additional descriptive features are required by the Notes. Examples are:—

Generally	—paras. 3.1, 5.8, 5.10, 5.20 and 5.21
Demolition	—Notes 3 and 5
Earthworks	—Notes 2, 3, 4, 5, 7 and 14. 18, 20, 21 and 22
Concrete	—Note 6
Pipework	—? Classes of pipework (gas, water, drainage etc.) to be billed separately. Notes 2, 4 and 6
Piling	—Note 11 (several categories)

etc.

The introduction of this apparent rigidity in subdivision and descriptive features is confusing and apt to be dangerous because in the final analysis the bill item must be complete and sufficient for its purpose and this requirement must not be subordinated to any mechanical sub-division.

It is to be supposed that the Coding is an indicator of standardisation though its purpose is not clear from para. 4.1, particularly as its use for numbering bill items is optional and if so used is not of contractual significance. Its usefulness as a means of constructing item descriptions is limited to the extent to which the itemisation is compatible with any given specification – it is surely not a function of a method of measurement to restrict these. Its usefulness as a means of applying a unique number to each different item is negatived by the restriction to eight effective digits in each division and by the many Notes requiring further divisions and descriptive features. To codify everything which cannot be compressed into this scale under one digit is to preclude its operation either as a means of setting up bill descriptions for computerisation or for purposes of retrieval of cost data. This has been admitted in that in the CIRIA Consultative Document on the Computerisation of Bills of Quantities, it has been accepted that the code must be opened out.

Defining the item content

It is the contractor's responsibility to provide and perform everything required to execute a given piece of work and it is therefore right to describe the components of the Works in terms of the finished product and not of the tasks to be carried out (para. 3.3). This is acceptable as a general proposition but may have to be modified where it is necessary to define the limits of an item or the demarcation between two items. Two problems arise in defining the item content:

(a) what needs to be described expressly and what ancillary items of work may properly and safely be implied;

(b) what is the position if any tasks are referred to (deliberately or inadvertently) or any temporary works are measured (as the CESMM requires in certain cases).

Item descriptions – to the extent that requirements are expressly described there should be no problem, but it is in fact impossible to describe civil engineering work exhaustively in the absolute sense. In the same way that Clause 8 of the ICE Conditions says of the Contractor's general responsibility:—

> "so far as the necessity for providing the same is specified in or *reasonably to be inferred* from the Contract"

so, when that overall responsibility is sub-divided into components, what is contained in each item must be clear or "reasonably to be inferred".

The CESMM sub-divides the Works into 24 Classes, each comprising up to three divisions and each of these up to eight descriptive features. In addition, there are references to "Additional description" (3.2 and 3.6) and Notes which indicate both additional requirements and in some cases where separate items are not required (3.7). There are, however, many matters which are not expressly referred to which could give rise to doubt and it would have been helpful if a rule had been propounded to enable a judgement to be arrived at as to whether these really require a mention or when they may be safely and properly left to be inferred. Contractors cannot be expected to know whether some ancillary matter is included in one item or another without being told not to forage through a mass of drawings when tendering to pick up deficiencies of bill descriptions. Blanket clauses sometimes put in Bills of Quantities (e.g. include for everything necessary whether or not expressly shown on Drawings, described in the Specification or referred to in this Bill) are not only unfair and unprofessional but legally unreliable. It is therefore essential to state precisely what secondary and ancillary matters are to be included. Whether this is done in the item descriptions themselves, in preambles or even in a separate document (provided this is incorporated into the contract by reference) is relatively immaterial. The fact remains that the only matters which can safely and properly be left to be inferred are those "contingently and indispensibly necessary" to the work described (and then only upon a narrow construction). The following limited examples will indicate the problem:—

Class A —Accommodation for the Engineer – are access roads, hardstandings, temporary fences etc. "accommodation"? They may be shown on drawings or specified but that does not determine whether they are to be measured separately or included.

Class D —Clearance down to what level – query removal of roots and filling of root-holes.

Class E —Settlement, query provision of tell tales.

Class F —Trial mixes, sampling and testing.

Class G —Linings to formwork.

What is not so easy to be sure about is the necessity to include in descriptions reference to matters which are stated in the Notes not to require separate measurement. Examples are to be found in Notes to:—

D (4 & 8); E (8, 9, 18); G (10, 13, 14, 19 & 21); I (9 & 10); J (2); K (1, 4, 6 & 8); L (8 & 9) etc.

On the footing that providing the wording is clear and unambiguous, the particular (the Bill of Quantities) over-rides the general (the SMM) it would seem safer if these matters (many of which cannot be said to be contingently and indispensibly necessary) were explicitly referred to in the item description.

Temporary Works

The policy of the CESMM is stated to be generally to identify components of the Permanent Works and not the tasks to be carried out (para. 3.3). The requirement to include for everything contingently and indispensibly necessary to produce the Permanent Works has been discussed in the preceding paragraph. But a number of items in Class A (accommodation, services, equipment and Temporary Works 271–8) and formwork in Class G, breach this rule. The necessity for this is not challenged but it follows if doubts are not to be raised that it must be made clear in the Bill of Quantities that apart from these particular items, all other temporary works must be included for in the Permanent Works to which they relate.

Similarly in connection with obligations and risks, specific reference to Performance Bond and Insurances must not be allowed to undermine the otherwise inclusiveness of the bill descriptions.

Into this category also come Method Related Charges (Section 7). Not only do these comprise temporary works but involve methods and tasks. Not only will they destroy the value of historic data but will cause great difficulty in adjudicating tenders (it will substantially increase the difficulty of identifying a "mistake") and be open to abuse and also put considerable onus on the Engineer when checking tenders to ensure that the contractual implications of the rest of the documents have not been impaired (e.g. what is to be included in bill items). They could even open the "Qualified Tender" door which would be unfortunate but perhaps worst of all, acceptance of such items in a tender could bring the contractual corollary that the tender is conditional upon their use and should the method, plant etc. prove inadequate the Contractor would be entitled to additional payment to provide what is adequate. Para. 7.5 says that the Contractor is not bound to adopt the method stated in the tender but it does not make it clear that the Contractor is otherwise responsible for the carrying out of the work.

The need for Method Related Charges seems to be misconceived in that it is generally recognised in practice that prices for permanent work are adjustable by reference to time factors as well as quantitative

factors – (the amplification of clauses concerning similarity of conditions merely expresses what has long been common practice). Components of permanent work are complicated, their pricing is complicated, and the ways in which they can be affected (by delay or disruption) are such that the separation of unreliable elements of price will do nothing to resolve the problems arising.

Para. 7.5 of CESMM states that Method Related Charges are not "subject to admeasurement". It is not clear what is intended here – though it would seem from para. 7.6 that they are to be paid. It seems to have been overlooked that Clause 60 is merely a procedural clause dealing with how payments shall be sought and made and that the entitlement to payment stems primarily from Clause 56. The word admeasurement has been retained from the Fourth Edition of the ICE Conditions and there would seem to be little doubt about its meaning in this context, namely, that Method Related items have to be included in the Contract Price. It cannot seriously be suggested that items which are numbered are by that definition not "measured" and included in the account any more than the provision of say the Engineer's accommodation designated in the quantity column as "Item" is not to be "measured" in the sense of being included in the Contract Price. It can hardly be intended to suggest that they are not subject to adjustment because it is more than likely that the issue of a variation could warrant an adjustment of both fixed and time related charges (though not necessarily in proportion to varied quantities) for example, if a contractor had inserted an item for "Traffic Diversion".

If in addition to these problems, the Contractor elects to change his methods (as he should be able to) then the problem of evaluating any variation (assuming it should be made) so as to be fair to Employer and Contractor alike would seem to be even more difficult.

Conditions and circumstances affecting Method or Cost

Paras. 5.8 and 5.10 refer to the necessity to distinguish between those parts of the Works of which the nature, location, access, limitation on sequence or timing, or other special characteristic gives rise to different methods of construction or considerations of cost. This requirement, dismissed in three or four lines, is as important as the many pages devoted to the sub-division of the Works into components. The only positive indication of the sort of thing involved is given in para. 5.20. Note F2 refers vaguely to location (and then only permissively). It is a great pity that no more definitive guidance could have been given because these considerations can have a very significant effect on cost – and risk; choice of plant and output from that plant can be substantially affected. In the absence of some guidance in this matter, claims will continue to arise. The Ministry of Transport Method of Measurement did give some such guidance. Admittedly this was limited to a particular field – but this could have been continued for road and bridge works (which form a fairly large proportion of total civil engineering construction) and could have been a guide for other types of work. Other circumstances relate to the conditions or restrictions under which work is carried out – difficulty of access, limited working area; restrictive or disruptive circumstances such as proximity to a railway, power lines, traffic bearing roads or airfield runways. There are, of course, many others and whilst it is important to convey these circumstances in the Bill of Quantities, it is even more important when some construction is so affected and other is not. It is not satisfactory to rely on the contractor spotting these difficulties in the short time available for tendering.

Prescribing the methods of calculating quantities

This is perhaps the simplest function of the SMM which has to be dealt with and in general the new CESMM copes with it adequately but there are certain points which seem to call for clarification or amplification. Some of these are:—

Dredging – no reference is made to the tolerances of depth generally permitted nor the effect of these upon measurement.

Excavation – the situation where the quantity of excavation depends upon the method adopted is not dealt with. In case of, say, a new road bridge to take a road over a new motorway it may be open to the Contractor to take out the excavation for the new structure from original ground level or to excavate the motorway first (in bulk) and take out structural excavation below formation. The taker-off will not know in advance which way a contractor may choose to operate and will have to make an arbitrary decision. He should be required to state what he has done and how the excavation will be measured in the event.

Conclusion

There is little to cavil at in the objects in view in revising the SMM as set out in the Foreword of the new CESMM and in concluding this paper, one might perhaps consider how far these objections have been achieved.

(a) To standardise the layout and contents of bills. In the sense that bills will still have to be standardised to suit the particular type of work involved, it seems unlikely that the new CESMM will (nor should) produce any radical change.

(b) To provide a systematic structure of bill items – the basis of this is here but it has been hampered by a totally unnecessary coding system (it is Bill of Quantities items for an item library that need to be coded not a SM) and largely negatived by the Notes.

(c) To review the sub-division of work into items would seem to be closely allied to (b) and similar remarks apply. One wonders whether more contractors than at present will be induced to undertake costings so that they may know more approximately the value of items of work. There would seem little demand for any particularly sensitive valuation of work. Judging by the variability of Bill of Quantities prices something more pragmatic seems to be required.

(d) To take account of new techniques – is unexceptionable, but it is understood that this is intended to refer to Method Related Charges which are open to a number of serious objections.

The proof of the pudding is in the eating and in preparing Bills of Quantities on the new CESMM, I have found it necessary to write a fairly lengthy preamble, clarifying some points, amending others, making good deficiencies of item coverage and so on. It can be done. It can be made to work. It is a pity that so much is necessary to make it work.