New Rules of Measurement

Introduction

Quantity surveying as in many other professions is responding to the development within the environment it operates. Recently, the RICS (Royal Institution of chartered Surveyors) issued a suite of new rules of measurement. The purpose of these rules is to:

- promote consistency
- provide a standard set of measurement rules that are understandable by anyone involved in a construction project
- give best practice guidance to RICS members.

Although principally based on UK practice, the need for a coordinated set of rules and underlying philosophy behind NRM has worldwide application. Three new rules are introduced to cover three different stages of construction processes:

1. The RICS new rules of measurement NRM 1: Order of cost estimating and cost planning for capital works. Measurement principle - elemental basis.
2. The RICS new rules of measurement NRM 2: detailed measurement for building works. Measurement principle - trade basis.

These rules are supported by the BCIS ‘Elemental Standard Form of Cost Analysis, (NRM) Edition, which sets out the principles of analysing building costs. Together, these rules deal with the quantification of buildings from ‘cradle to grave’ – from inception to demolition.

NRM 1 - Order of cost estimating and cost planning for capital building works

NRM 1 forms part of the RICS suit of publications referred to as the ‘new rules of measurement (NRM)’. The RICS Quantity Surveying and Construction Group have developed the NRM suit of documents. The primary aim of the rules is to provide a consistent approach to the measurement and quantification of capital building works and maintenance, supported by a common means of analysing cost data for future use.

NRM 1 provides essential guidance on the quantification of building works for the purpose of preparing cost estimates and cost plans. They provide direction on how to quantify other items that form part of the total cost of a construction project, but which are not reflected in the measurable building work items (e.g. preliminaries, overheads and profit, project team and design team fees, risk allowances, inflation, and other development and project costs). Additionally, the rules can be used as a basis for capturing historical cost data in the form required for use in future order of cost estimates and cost plans, thereby completing the ‘cost management cycle’.

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NRM 1 provides not only a uniform basis for measuring building works and other items but also embody the essentials of best practice.

NRM 1 provides the ‘cornerstone’ of good cost management of capital building projects – by enabling cost managers to give more effective, accurate and transparent cost advice to employers and other project team members, as well as facilitating better cost control. More importantly it aids the cost manager to ensure that capital building projects are designed to an agreed cost, rather than allowing designers to set the costs based on their designs.

Although written primarily for the preparation of order of cost estimates and cost plans, the rules can also be used as a guide when preparing approximate estimates, including those for relatively low-value building projects. In addition, they can be used to quantify replacement components (e.g. replacement windows), building maintenance items (e.g. redecoration) and demolition works for the purpose of whole life cycle cost (or value) assessments. However, they do not deal with the maintenance and operation of mechanical and electrical services installation or other works and services carried out throughout the life cycle a building.

**NRM 1 and Building Information Modelling (BIM)**

Building information modelling, better known as ‘BIM’ – is a co-ordinated set of processes, supported by technology that seeks to add value by creating, managing and sharing the properties of a built asset throughout its lifecycle. BIM incorporates data – physical, commercial, environmental, and operational – on every element of a development’s design.

The purported benefits of BIM are:

- **Better outcomes through collaboration** - All project team members – different design disciplines, the cost manager, project manager, employer, contractor, specialists and suppliers – use a single, shared 3D model, cultivating collaborative working relationships. This is to ensure that all involved are focused on achieving best value, from project inception to eventual decommissioning;

- **Enhanced performance** - BIM makes possible swift and accurate comparison of different design options, enabling development of more efficient, cost-effective and sustainable solutions;

- **Optimised solutions** - Through deployment of new generative modelling technologies, solutions can be cost-effectively optimised against agreed parameters;
- **Greater predictability** – Capital building works projects can be visualised at an early stage, giving owners, users and operators a clear idea of design intent and allowing them to modify the design to achieve the outcomes they want. It is also advocated that in advance of construction, BIM will also enable the project team to 'build' the project in a virtual environment, rehearsing complex procedures, optimising temporary works designs and planning procurement of materials, equipment and manpower;

- **Faster project delivery** – Significant time savings are achievable by agreeing the design concept early in building project development to eliminate late stage design changes; using standard design elements when practicable; resolving complex construction details before the project goes on site; avoiding clashes; taking advantage of intelligence and automation within the model to check design integrity and estimate quantities; producing fabrication and construction drawings from the model; and using data to control construction equipment;

- **Reduced safety risk** - Crowd behaviour and fire modelling capability enable designs to be optimised for public safety. Asset and facilities managers can use the 3D model to enhance operational safety. Contractors can minimise construction risks by reviewing complex details or procedures before going on site;

- **Fits first time** - Integrating multi-disciplinary design inputs using a single 3D model allows interface issues to be identified and resolved in advance of construction, eliminating the cost and time impacts of redesign. It is also contended that BIM enables new and existing assets to be integrated seamlessly;

- **Reduced waste** - Exact quantity take-offs mean that materials are not over-ordered. Precise programme scheduling enables just-in-time delivery of materials and equipment, reducing potential for damage. Use of BIM for automated fabrication of equipment and components enables more efficient materials handling and waste recovery;

- **Whole life asset management** - BIM models contain product information that assists with commissioning, operation and maintenance activities – for example sequences for start-up and shut-down, interactive 3D diagrams showing how to take apart and reassemble equipment items and specifications allowing replacement parts to be ordered; and

- **Continual improvement** - Project team members can feed back information about the performance of processes and items of equipment, driving improvements on subsequent projects.
NRM 2: detailed measurement for building works. Measurement principle - trade basis

NRM 2 became effective on 1 July 2013, thereby substituting the seventh edition of the Standard Method of Measurement (SMM7), the first edition of which had been published in 1921.

Like its predecessor, NRM 2 provides guidance on the detailed measurement and description of building works for the sole purpose of obtaining prices from contractors. These rules address all aspects of bill of quantities (BQs) production, including setting out the information required from the employer and other construction consultants to enable the preparation of a BQ, as well as dealing with the quantification of non-measurable work items, contractor designed works (sometimes referred to as ‘Contractor’s Design Portion (CDP)’) and the transference of risks to the contractor. NRM 2 covers the full range of possible building works activities, breaking these down into 41 work sections.

While written primarily for the preparation of BQs, quantified schedules of works and quantified work schedules, NRM 2 provide a basis for designing and developing both standard and ‘in-house’ schedules of rates.

This course deals with detailed measurement and description of building works for the purpose of obtaining a tender price, therefore, NRM 2 is used.

According to the RICS, the rules address all aspects of bill of quantities (BQ) production, including setting out the information required from the employer and other construction consultants to enable a BQ to be prepared, as well as dealing with the quantification of non-measurable work items, contractor designed works and risks. Guidance is also provided on the content, structure and format of BQ, as well as the benefits and uses of BQ. It also covers quantified schedules of works and quantified work schedules, the rules will be invaluable when designing and developing standard or bespoke schedules of rates.

Purpose of NRM 2

- NRM 2 is written to provide a standard set of measurement rules for procurement of building works thereby aiding communication between the project/design team and employer
- It provides rules of measurement for preparation of bill of quantities, schedule of works (quantified), a framework to develop bespoke and standard schedule of rates
- It addresses all aspects of bill of quantities production, including quantification of non-measurable work item, contractor design works and risks

Use of NRM 2

1. It provides a structured basis for measuring building work and presents a consistent approach for dealing with other key cost components associated with building components

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2. For the production of bill of quantities for the entire project and discrete work packages as well as preparation of quantified schedules of works and quantified work schedules

3. To construct both bespoke and standard schedule of rates for (i) discrete contracts, (ii) term contracts and (iii) framework arrangements

Structure of NRM

NRM 2 is divided into three parts with supporting appendices.

Part 1: measurement of works procurement is placed in the context of the RIBA Plan of Work and the OGC Gateway Process. Also part 1 explains the symbols, abbreviations and definitions used in the new rules.

Part 2: explains different issues relating to the new rules, BOQ, preliminaries, contractor design, risks etc. The specific issues covered are:

- outlines the benefits of detailed measurement,
- describes the purpose and use of RICS new rules of measurement,
- explains the function of bill of quantities,
- provides work breakdown structures for BOQ,
- defines the information required to enable preparation of BOQ,
- describe the key constituent of BOQ, explain how to prepare BOQ,
- sets out the rules of measurement for the preparation BOQ
- provides the method for dealing with contractors’ preliminaries, contractors’ overhead and profit, contractors’ design fees and
- other issues relating to development/project costs, risks, inflation, and data gathering for supporting claims for tax incentives

Part 3: comprises of the tabulated rules for the measurement and description of building works for the purpose of works procurement.

Use of tabulated rules of measurement for building works

General

1. The rules of measurement for building works are set out in tables. The tables are divided into two categories, namely those dealing with:

   - preliminaries; and
   - measurement of building components/items.

2. The rules are written in the present tense.

3. The symbol ‘/’ used between two or more units of measurement or within text, means ‘or’.

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4. Enumerated item with ‘nr’ without capital or full stop

5. Point as a decimal marker (00.22) and comma for thousand separator (2,000.00) although contrary to BS 8888 (comma for decimal and space as thousand separator)

6. Horizontal lines divide the tables and rules into zones to which different rules apply.

7. Where units of measurement or rules are separated by a broken line ( - - - - ) this denotes a choice of units or choice of ways of measuring the work. The method chosen shall be the best to suit the particular situation.

8. The use of a hyphen (-) or the phrase ‘to’ between two dimensions in these tables or in a bill of quantities means a range of dimensions exceeding the first dimension stated but not exceeding the second.

**Tables: preliminaries**

Work Section 1 comprises the rules for describing and quantifying preliminaries. It is divided into two sub-sections as follows:

- preliminaries (main contract); and
- preliminaries (work package contract).

Both sub-sections are sub-divided into parts as follows:

- Part A: Information and requirements (i.e. dealing with the descriptive part of the preliminaries); and
- Part B: Pricing schedule (i.e. provides the basis of a pricing document for preliminaries).

The tables for information and requirements for both preliminaries (main contract) and preliminaries (work package contract) are structured as follows:

1. Information and requirements are specified under a number of headings, which are given above each table (i.e. project particulars; drawings and other documents; and the site and existing buildings);

2. The left hand column (sub-heading 1) lists the preliminaries items to be considered under each main heading;

3. The second column (sub-heading 2) lists the sub-items to be considered under each sub-heading;

4. The third column (information requirements) lists the information which shall be included within the preliminaries descriptions; and

5. The fourth column (supplementary information/notes) lists supplementary information that might need to be included within the preliminaries descriptions, as well as providing additional guidance on the drafting of preliminaries statements.
The pricing schedule tables for both preliminaries (main contract) and preliminaries (work package contract) are structured as follows:

1. The contractor’s pricing of preliminaries are captured under a number of headings, which are given above each table (i.e. project particulars; drawings and other documents; and the site and existing buildings);
2. The left hand column (component) lists the preliminaries items to be considered under each main heading;
3. The second column (included/notes on pricing) lists the sub-items which form part of each item;
4. The third column (unit) lists the unit of measurement for preliminaries items;
5. The fourth column (pricing method) stipulates if the component is a ‘fixed charge’, a ‘time-related charge’, or a combination of both; and
6. The fifth column (excluded) describes the items excluded from a component. Where exclusions are stated, cross references to the appropriate component is given.

**Tables: building components/items**

Work sections 2 to 41 comprise the rules of measurement for building components/items. They are as follows:

**Work section:**

2. Off-site manufactured materials, components and buildings:
3. Demolitions;
4. Alterations, repairs and conservation;
5. Excavating and filling;
6. Ground remediation and soil stabilisation;
7. Piling;
8. Underpinning;
9. Diaphragm walls and embedded retaining walls;
10. Crib walls, gabions and reinforced earth;
11. In-situ concrete works;
12. Precast/composite concrete;
13. Precast concrete;
14. Masonry;
15. Structural metalwork;
16. Carpentry;
17. Sheet roof coverings;
18. Tile and slate roof and wall coverings;
19. Waterproofing;

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20. Proprietary linings and partitions;
21. Cladding and covering;
22. General joinery;
23. Windows, screens and lights;
24. Doors, shutters and hatches;
25. Stairs, walkways and balustrades;
26. Metalwork;
27. Glazing;
28. Floor, wall, ceiling and roof finishings;
29. Decoration;
30. Suspended ceilings;
31. Insulation, fire stopping and fire protection;
32. Furniture, fittings and equipment;
33. Drainage above ground;
34. Drainage below ground;
35. Site works;
36. Fencing;
37. Soft landscaping;
38. Mechanical services;
39. Electrical services;
40. Transportation; and
41. Builder's work in connection with mechanical, electrical and transportation installations.

**Structure of the table**

1. The title of the work section is given in the heading;
2. The first two rows set out the:
   a. drawn information required in respect of each work section to enable measurement and shall accompany the bill of quantities when issued,
   b. mandatory information that is to be provided in each work section,
   c. minimum information that shall be shown on the drawings or any other document that accompany each work section, and
   d. works and materials that not measured, but are deemed to be included in the building components/items measured in each work section;
3. The left hand column (item) lists the building components/items commonly encountered in building works;
4. The second column (unit) lists the unit of measurement for building components/items;

5. The third column (level 1) lists the information, including any dimension requirements, that shall be included in the description of the building components/items;

6. The fourth column (level 2) lists the supporting information, including any additional dimension requirements, which shall be included in the description of the building components/items;

7. The fifth column (level 3) lists the further supporting information, including any additional dimension requirements, which shall be included in the description of the building components/items; and

8. The sixth column (notes, comments and glossary) explains what work is deemed to be included in specific building components/items, clarifies the approach to quantification and description of building components/items, and contains definitions of specific terms and phrases used in connection with the building components/items.

The building components/items listed in the tables comprise those commonly encountered in building works; the lists are not intended to be exhaustive.

Levels
The NRM 2 uses a series of levels to describe and measure the work in increasing detail. The complexity of description will determine the number of levels to be used. Let us examine few examples: reinforced in-situ concrete works in section 11 and carpentry work in section 16 of the NRM 2.
Example 1: Levels for the measurement of reinforced concrete columns

<table>
<thead>
<tr>
<th>Level</th>
<th>NRM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SECTION</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SUBSECTION</td>
</tr>
<tr>
<td></td>
<td>UNIT</td>
</tr>
<tr>
<td>5</td>
<td>LEVEL 1</td>
</tr>
<tr>
<td>6</td>
<td>LEVEL 2</td>
</tr>
<tr>
<td>7</td>
<td>LEVEL 3</td>
</tr>
</tbody>
</table>
**Example 2: Levels for the measurement roofing**

<table>
<thead>
<tr>
<th>Level</th>
<th>SECTION</th>
<th>UNIT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SECTION</td>
<td></td>
<td>Carpentery</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Timber framing</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Nil</td>
</tr>
<tr>
<td>4</td>
<td>SUBSECTION</td>
<td></td>
<td>Primary or structural timbers, Backing and other first fix timbers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT</th>
<th>NRM 2 LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>nr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>NRM 2 LEVELS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 LEVEL 1</td>
<td>16.1.1 Nominal size stated (e.g. 125 x 50)</td>
<td>16.3.1. Nominal dimensioned description of each member (e.g. batten 50x25)</td>
</tr>
<tr>
<td>6 LEVEL 2</td>
<td>16.1.1.3 Wall plates</td>
<td>16.3.1.2 Battens</td>
</tr>
<tr>
<td>7 LEVEL 3</td>
<td>16.1.1.3.1 Selection and protection for subsequent treatment</td>
<td>Nil</td>
</tr>
</tbody>
</table>
**Compound items**

NRM 2 relies on compound pricing, relies on simpler measurement and concentrates on the measurement on the items that carry the most costs. In comparison with SMM7 there are fewer items to measure, e.g. labour items are not measured. A typical example is level and compact the surface of the excavation to receive foundations (level 3 item 5 NRM p.132) and working space (level 3 item NRM p. 132). The logic behind NRM 2 is that items like these will be incorporated into the pricing of the work.

<table>
<thead>
<tr>
<th>Excavation, bulk excavation 2-4m deep</th>
<th>37m³@£15/ m³</th>
<th>555</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working space: excavation</td>
<td>7m³@£20/ m³</td>
<td>140</td>
</tr>
<tr>
<td>Working space: backfill</td>
<td>7m³@£30/ m³</td>
<td>210</td>
</tr>
<tr>
<td>Bulking</td>
<td>37 + 7 = 44 m³ x 1.25% = 55 m³</td>
<td></td>
</tr>
<tr>
<td>Disposal off-site</td>
<td>55 m³@£80 m³</td>
<td>4400</td>
</tr>
<tr>
<td>Staging</td>
<td>Say 35@£1/ m³</td>
<td>25</td>
</tr>
<tr>
<td>Landfill tax</td>
<td>37 m³ x 1400/1000 =</td>
<td>54t@£2.50/t</td>
</tr>
<tr>
<td>Compact surface</td>
<td>17m²@£2/ m²</td>
<td>34</td>
</tr>
<tr>
<td>NRM 5.9</td>
<td>Disposal of excavated material off site</td>
<td>Item</td>
</tr>
</tbody>
</table>

**Measurement rules for building works**

The BQ shall fully describe and accurately represent the quantity and quality of the works to be carried out. Where necessary, more detail than is required by these rules shall be given in order to define the precise nature and extent of the required work.

**Quantities**

The rules for quantifying building components/items are as follows:

1. **Measurement and billing:**
   a. Measure work net as fixed in position unless otherwise stated.
   b. Net quantity measured shall be deemed to include all additional material required for laps, joints, seams and the like, as well as any waste material.
   c. Curved work shall be measured on the centre line of the material unless otherwise stated.
   d. Dimensions shall be measured to the nearest 10mm. 5mm and over shall be regarded as 10mm and less than 5mm shall be disregarded.
e. Except for quantities measured in tonnes (t), quantities shall be given to the nearest whole number. Quantities less than one unit shall be given as one unit. Quantities measured in tonnes (t) shall be given to two decimal places.

2. **Voids**:
   a. Unless otherwise stated, minimum deductions for voids refer only to openings or wants within the boundaries of the measured work.
   b. Always deduct openings or wants at the boundaries of measured areas, irrespective of size.
   c. Do not measure separate items for widths not exceeding a stated limit where these widths are caused by voids.

**Descriptions**

a) Each work section of a bill of quantities shall begin with a heading and a description stating the nature and location of the work.

b) Headings for groups of building components/items (i.e. components and sub-components) in a bill of quantities shall be read as part of the descriptions of the items to which the headings apply.

c) Descriptions shall state the building components/items being measured (taken from the first column of the tabulated rules) and include all Level 1, 2 and 3 information (taken from the third, fourth and fifth columns respectively) applicable to that item. Where applicable, the relevant information from column five shall be included in the description.

d) Unless specifically stated otherwise in the bill of quantities or in these rules, descriptions for building components/items shall include the:

1. type and quality of the material;
2. critical dimension(s) of the material(s);
3. method of fixing, installing or incorporating the goods or materials into the work where not at the discretion of the contractor; and
4. nature or type of background.

e) Where the nature or type of background is required to be identified, the building components/items description shall state one of the following:

1. timber (the term includes all types of hard and soft building boards);
2. plastics;
3. masonry (the term includes brick, concrete, block, natural and reconstituted stone);
4. metal, of any type;
5. metal-faced timber or plastics; and
6. vulnerable materials (the term includes glass, marble, mosaic, ceramics, tiled finishes, material finishes and the like).

f) Dimensions given as part of the description shall be:
1. stated in the sequence: length, width and height. Where ambiguity could arise, the dimensions shall be identified in the description;
2. the finished lengths, widths and heights specified or shown on the drawings with no allowance made for overlaps, scarcements and the like.

g) Thicknesses given as part of the description shall be the finished thickness of the material after compaction and shall exclude the thickness of adhesives and or bedding materials unless otherwise stated.

h) The use of a hyphen (-) or the phrase ‘to’ between two dimensions in a description shall mean a range of dimensions exceeding the first dimension stated but not exceeding the second.

i) Where the rules require work to be described as ‘curved’ with the radius stated, details shall be given of the curved work, including if concave or convex, if conical or spherical, if to more than one radius, and shall state the radius or radii. The radius shall be the mean radius measured to the centre line of the material unless otherwise stated.

j) The information required by these rules may be given by a precise and unique cross-reference to another document (e.g. to a specification or to a catalogue).

k) Where other components and sub-components are referred to in other documents (e.g. a specification states that vinyl sheet flooring is to be laid on a plywood lining), each component and or sub-component shall be measured and described separately (i.e. both the vinyl sheet flooring and the plywood lining are to be measured as separate items).

l) Any component, sub-component or other element of the work not clearly included in the description shall be deemed not to be included as part of the composite building components/items. Notwithstanding the requirements of paragraph k above, separate components or sub-components may be combined to form single composite building components/items. In such cases, the description of the composite building components/items shall clearly state what is included and how each component and or sub-component is to be incorporated.

m) Unless specifically stated otherwise in the BQ or in these rules, each building component/item shall be deemed to include the following:

1. labour and all costs in connection therewith;
2. materials and goods together with all costs in connection therewith;
3. assembling, installing, erecting, fixing or fitting materials or goods in position;
4. plant and all costs in connection therewith;
5. waste of goods or materials;
6. all rough and fair cutting unless specially stated otherwise;
7. establishment charges; and
8. cost of compliance with all legislation in connection with the work measured including health and safety, disposal of waste and the like.
**Work of special types**

**a)** Work of each of the following special types shall be separately identified. Work of special types includes:

1. Work to existing buildings: such work is defined as work on, in or immediately under work existing before the current building project. Specific details pertaining to work carried out to an existing building shall be given at the start of each applicable work section.
2. Work carried out and subsequently removed: specific details pertaining to work that is to be carried out and subsequently removed shall be given at the start of each applicable work section.
3. Work outside the curtilage of the site: specific details pertaining to work to be executed outside the curtilage of the site shall be given at the start of each applicable work section.
4. Work carried out in extraordinary conditions, including:
   5. in, on or under water, stating whether river, canal, lake or sea and, where applicable, stating the mean spring levels of high and low water;
   6. in tidal conditions;
   7. underground, stating mean depth;
   8. in compressed air, stating the pressure and means of entry and exit; and
   9. in other types of extraordinary conditions.

**b)** Specific details pertaining to work carried out in each condition shall be given at the start of each applicable work section.

**c)** The additional rules for special types of work shall be read in conjunction with the rules in the appropriate work sections.

**d)** Details of the additional preliminaries that are pertinent to the special types of work shall be given in the description, drawing attention to any specific requirements due to the nature of the work.

**Measurable work not covered by the tabulated rules**

**a)** Building components/items not covered by the tabulated rules shall, if possible, be measured by rules for similar types of work. Rules of measurement adopted for such building components/items shall be clearly stated and fully defined in either the preliminaries or in the bill of quantities (against the building components/items or items to which the rule relates). Such rules shall, as far as possible, conform to those given in the tabulated rules of measurement for similar building components/items.

**b)** Where it is not possible to derive the method of measurement from the tabulated rules, the rules chosen may be bespoke. In such cases, the rule or rules derived shall be reiterated in full in either the preliminaries or in the bill of quantities (above the building components/items or items to which the rule relates).
Procedures

Procedure where work cannot be quantified:

For the rules relating to work which cannot be quantified, refer to non-measurable works in Part 2 of these rules.

Procedure where exact type of product or component is not specified:

a) Where the exact type of product or component cannot be specified, an estimated price for the product or component shall be given in the description as a prime cost price (PC price). State, for example, ‘Allow the PC price of £x per thousand delivered to site’, ‘Allow the PC price of £y per m$^2$ delivered to site’, or ‘Allow £z each delivered to site’.

b) Unless specifically stated otherwise in the bill of quantities or in these rules, the contractor shall be deemed to have allowed for all items listed in paragraph 3.3.3.13 in his or her priced rate for each building component/item incorporating a PC price.

c) PC prices shall exclude any allowance for the main contractor's overheads and profit, which are dealt with separately.

Procedure where quantity of work cannot be accurately determined:

a) Where work can be described and given in items in accordance with the tabulated rules of measurement but the quantity of work cannot be accurately determined, an estimate of the quantity shall be given and identified as a ‘provisional quantity’.

b) Work items identified as a ‘provisional quantity’ shall be subject to remeasurement when they have been completed. The ‘approximate quantity’ shall be substituted by the ‘firm quantity’ measured, and the total price for that item adjusted to reflect the change in quantity. Where the variance between the ‘provisional quantity’ and the ‘firm quantity’ measured is less than 20 per cent, the rate tendered by the contractor shall not be subject to review. Where the variance is significant (i.e. 20 per cent or more), the rate can be reviewed to ensure that the rate is fair and reasonable to both the employer and contractor.

Appendices: it consists of seven (A-G) appendices comprising guidance, templates and an example. Guidance on preparation of BOQ, template for preliminaries (main contract) pricing schedule both condensed and expanded. It also consists of pricing summary for elemental bill of quantities both condensed and expanded, template for provisional sums, risks and credits and example of a work package breakdown structure.

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NRM 3 – Order of cost estimating and cost planning for building maintenance works

NRM 3, to be published in 2014, will provide guidance on the quantification of maintenance works for the purpose of preparing order of cost estimates for building maintenance works during the strategic or business justification stages of a capital building project, and cost plans for building maintenance works during the design and development stages of a capital building project. NRM 3 can also be used in preparing asset-specific cost plans and life cycle cost plans for existing buildings and facilities (i.e. for setting budgets and for procuring building maintenance for existing premises). However, NRM 3 does not address operational costs or other soft costs associated with the operation of buildings or facilities.

NRM 3 follows the same framework, cost code structure and premise as NRM 1. Consequently, NRM 3 also provides direction on how to quantify and measure other items associated with building maintenance that are not reflected in the measurable maintenance works items (e.g. maintenance contractor’s management and administration charges, overheads and profit, other maintenance-related costs, consultants’ fees and risks in connection with maintenance works.

Unlike capital building works projects, maintenance works are required to be carried out from the day the building is put to use (or handed over to the employer) until the end of its life. Accordingly, while the capital cost of building projects are usually incurred by the building owner or developer over a relatively short-term, costs in connection maintenance are incurred throughout the life the building – over the long-term. In view of this, NRM 3 also provides guidance on the measurement and calculation of the time value of money (i.e. the present value), guidance on using the measured data to inform life cycle cost plans, as well as providing guidance on value added tax (VAT), and enhanced capital allowances and other financial incentives.

Together, NRM 1 and NRM 3 provide the rules for measurement, as well as the methodology for compiling, whole life cycle cost plans. Moreover, in the same way that NRM 1 does for capital building works, the rules within NRM 3 provide a framework for analysing building maintenance costs so that maintenance cost data is in a form that is readily useable in future cost estimates and cost plans for building maintenance works.

BCIS ‘Elemental Standard Form of Cost Analysis (NRM Edition)

The BCIS (Building Cost Information Service) ‘Elemental Standard Form of Cost Analysis (NRM Edition) – often referred to as the BCIS SFCA - provides a cost data capture methodology that allows comparisons to be made between the cost of buildings and building elements. The BCIS SFCA was first published in 1961, and was updated using the same elemental and data structure in 1969 and 2008. The BCIS is a business division of the RICS.
In 2012, the BCIS SFCA published a new edition of the SFCA, which has now shares the same elemental definitions and cost data structure devised for NRM 1 and NRM 3.

Figure 1.2: Relationship and purpose of the RICS NRM suite of measurement rules

NRM 3 supports the BIM process by:

- Providing both a common work breakdown structure (WBS) and a cost breakdown structure (CBS);
- Providing a common cost data structure;
- Providing a codification framework;
- Providing standard element definitions;
- Providing transparency of costs; and
- Supporting designing to a cost;
NRM – The Benefits

- Training and education:
  - Promote common-sense;
  - Tabulated information act as an invaluable ‘aide memoir’;
  - Help learning - both measurement and construction knowledge (the rules are aimed at students learning as much as Practitioners – it has been written with all levels of user in mind); and
  - Establish cost estimating and cost planning competencies required by students, which universities and other learning establishments need to deliver.

- Approach:
  - Introduce formal estimating stages - aligned to both the ‘RIBA Plan of Work’ and the ‘OGC Gateway Process’;
  - Present a clear framework, which facilitates a systematic approach to compiling cost estimates and cost plans; and
  - Provide a comprehensive work breakdown structure (WBS) and a cost breakdown structure (CBS) for cost estimates and cost plans – both for projects comprising a single buildings and projects encompassing more than one building or structure.

- Measurement:
  - Recognise that measurement is progressive (i.e. an iterative process which is dependent upon the design information available);
  - Provide a uniform basis on which to measure areas;
  - Measurement of cost significant items (i.e. components)– adopts Pareto’s principle (the 80-20 rule); that is, 80 per cent of the cost of the building is in 20 per cent of the items measured; and
  - Provide a uniform approach to measurement of components (i.e. building works items – for new works and rehabilitation works, as well as for future replacement).
Modern construction:

- Deal with modern construction products and methods, including modular units and complete buildings; and
- Consider sustainable construction.

Preliminaries:

- Define main contractor’s preliminaries, which can be used for any procurement or contract strategy (including prime contracting and private finance initiatives).

Risk management:

- Support the need for a risk management strategy;
- Promote use of risk allowances, and the view that risk allowances should not be a standard percentage, but a properly considered assessment of the cost of dealing with risk should they occur, which must be managed; and
- Define four categories of risk (i.e. design development risk, construction risk, employer’s change risks and employer’s other risks).

Inflation:

- Define two categories of inflation (i.e. tender inflation and construction inflation – with unexpected changes in market conditions being treated as a risk); and
- Define measurement of inflation.

Cost management:

- Promote budget setting using a cost limit, which includes allowances for risk - its purpose to provide a realistic cost limit for project cost control within which a construction project can proceed without further resource and time intensive authorisation requirements; and
- Help establish more effective cost control systems;
- Provide essential guidance on dealing with non-construction related costs such as consultants’ fees and other development and project costs (the cost of acquiring land and property, fees and charges, planning contributions, decanting and relocation costs, marketing costs and the cost of finance); and
- Provide advice on how to deal with VAT, taxation allowances, taxation relief and grants.

- **Accuracy of estimates:**
  - Define the information required by cost manager to produce cost estimates and cost plans at each formal estimating stage; and
  - Help improve the accuracy of cost estimates and cost plans.

- **Innovative:**
  - Deal with the total cost of delivering a building project, not simply construction costs (total cost management);

- **Value management and value for money:**
  - Perform an essential part of a value for money (VfM) framework - particularly for central government (e.g. Office of Government Commerce (OGC) and Ministry of Defence (MoD)), local government, and other public funded organisations who have an obligation to demonstrate that value for money (VfM) has been achieved in construction projects;
  - Help underpin a business case for a building project;
  - Quantification of replacement components and building maintenance items for the purpose of whole life cycle cost/value assessments;
  - Aid value management (VM) and value engineering (VE) processes;
  - Afford greater transparency to cost estimates and cost plans (note: transparency can assist with fraud prevention);
  - Aid actual cost scrutiny; and
  - Help improve clear and effective communication between the employer and project team members – thereby making sure that risks associated with the building project are identified, analysed, and responded to.

- **Procurement:**
  - Provide a method for codifying elemental cost plans so that they can be converted to works packages for procurement, and cost management during the construction stage; and
  - Aid cost management during the construction phase of a project.
• Data acquisition, analysis and evaluation:

  – Provide robust basis for capturing historical cost data in the form required for future cost estimates and cost plans, thereby completing the ‘cost management cycle’.

• Usability:

  – Can be computerised (i.e. cost estimating and cost planning systems, together with integral reporting).

• Quality control:

  – Can be integrated into an organisation’s quality management system (QMS).

• Training and education:

  – Promote common-sense;
  – Tabulated information act as an invaluable ‘aide memoir’;
  – Help learning - both measurement and construction knowledge (the rules are aimed at students learning as much as Practitioners – it has been written with all levels of user in mind); and
  – Establish cost estimating and cost planning competencies required by students, which universities and other learning establishments need to deliver.

Most importantly, the rules exemplify ‘best practice’. They provide the foundation for better-cost advice that in turn, will help establish more effective cost control systems, and procedures to help instil greater employer confidence in cost advice received – as well as the confidence of project team members.

What is more, cost estimates and cost plans produced in accordance with the rules should give greater confidence to banks and other lenders providing funding for construction projects that requests for funds have been properly thought out by those wishing to obtain finance. Although based on UK practice, the underlying philosophy of the rules has worldwide application.
References

RICS (2013) RICS new rules of measurement (NRM 2) – detailed measurement for building works, 1st edn, RICS publication


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