

# ICMS explained

A user guide for the second edition of the  
International Construction Measurement Standards

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## Acknowledgments

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# Contents

|  |           |
|--|-----------|
| <b>ICMS explained</b>  | <b>3</b>  |
| <b>Acknowledgments</b>   | <b>4</b>  |
| <b>1 Introduction</b>  | <b>7</b>  |
| 1.1 Cost Reporting Standards   | 7         |
| 1.2 Purpose of this user guide   | 7         |
| <b>2 Design principles and philosophy</b>  | <b>9</b>  |
| 2.1 Objectives   | 9         |
| 2.2 Why is it important?   | 9         |
| 2.3 Addressing both buildings and civil engineering  | 9         |
| 2.4 Projects and subprojects   | 11        |
| <b>3 Structure, cost framework and hierarchical levels</b>                                 | <b>12</b> |
| 3.1 Structure  | 12        |
| 3.2 Cost framework, hierarchical levels and attributes                                     | 14        |
| 3.2.1 Level 1: project or subproject   | 16        |
| 3.2.2 Level 2: cost categories   | 17        |
| 3.2.3 Level 3: cost groups   | 19        |
| 3.2.4 Level 4: cost sub-groups   | 21        |
| 3.3 Project attributes and values  | 21        |
| <b>4 Life cycle cost considerations</b>  | <b>23</b> |
| <b>5 Other ICMS appendices</b>   | <b>24</b> |
| <b>6 Uses</b>  | <b>26</b> |
| 6.1 Early conversations  | 26        |
| 6.2 Benchmarking and cost reporting  | 26        |
| 6.3 Cost classification and analysis   | 27        |
| 6.4 Claims analysis and forensics  | 27        |
| 6.5 Work breakdown structures  | 27        |
| 6.6 BIM models   | 27        |
| <b>7 Limitations</b>   | <b>29</b> |
| 7.1 Measurement Detail   | 29        |
| 7.2 Currency and specification   | 30        |
| 7.3 Extent of coverage – civil engineering   | 31        |
| 7.4 Availability of life cycle data  | 31        |
| <b>8. Differences from elemental cost planning</b>   | <b>32</b> |
| 8.1 Classification principles  | 32        |
| 8.2 Substructure and structure delineation   | 32        |
| 8.3 Loadbearing and non-loadbearing delineation  | 33        |
| 8.4 Alignment to design disciplines  | 34        |
| <b>Appendix 1: ICMS example</b>  | <b>36</b> |
| <b>Appendix 2: ICMS codes for buildings and civil engineering projects</b>                 | <b>38</b> |
| <b>Appendix 3: ICMS and other construction information and cost classification systems</b> | <b>54</b> |
| <b>Appendix 4: Survey detail accuracy band table</b>                                       | <b>54</b> |
| <b>Appendix 5: Further information</b>   | <b>55</b> |

# 1 Introduction



## 1.1 Cost Reporting Standards

Accurate and consistent cost reporting/planning is an essential tool for professional construction cost consultants in giving advice to their clients. In Ireland since its publication in 1970 cost professionals have relied on the National Standard Building Elements (last published 1993) and based on the international SFB cost reporting system, as their mainstay for cost reporting building construction costs. In respect to Civil Engineering works since 2007 the OGP have produced standard cost reports/planning for three types of civil engineering projects, namely roads, water services and marine works. The OGP have also adopted the National Standard Building Elements for reporting building costs.

SCSI as a founding member of the International Construction Measurement Standards Coalition and the International Property Measurement Standards Coalition is committed to adopting these recognised international cost reporting and property measurement standards as part of our commitment to providing a consistent and comprehensive cost reporting system which covers the whole range of all construction projects ( building and civil) to a detailed level of costs groups for all projects incorporating standard reporting for Life Cycle costs consistent with recognised ISO standards.

SCSI advises that its professional members are conversant with ICMS 2 as the best international practice for cost reporting construction projects to their clients both nationally and internationally and its use has the support of the EU. Whilst it is not in SCSI's remit to suggest that construction project clients abandon their own existing or national cost reporting standards it should be noted that in respect to building costs ICMS2 cost groups are almost identical with the current National Standard Building Elements. ICMS 2 also offers much more such to addressing key project information to be provided, costs levels for up to 14 or more differing construction project types and the first standard for life cycle cost reporting. Further it offers for the first time a consistent measurement rule for measuring gross and internal buildings areas for both construction costs and property valuations.

This guide should be read in conjunction with the SCSI 's user guide for International Property Measurement Standards and the SCSI mapping guide between ICMS2 and the National Standard Building Elements.

## 1.2 Purpose of this user guide

International Construction Measurement Standards: Global Consistency in Presenting Construction and Other Life Cycle Costs, 2nd edition was published in September 2019 for use in cost reporting. Since the inception of the first edition of ICMS, which was published in July 2017, the driving principle has been that consistent practices in presenting construction costs globally will bring significant benefits to construction cost management.

This document provides a brief guide to the background, structure, content and potential use of the second edition of ICMS. It explains the various sections of ICMS and provides detailed guidance on using the appendices, as well as explaining the classification system used in ICMS. Appendix 1 of this user guide contains a worked example, while Appendix 2 provides templates for use with ICMS.

Please note that unless otherwise indicated, all references to 'ICMS' in this document refer to the second edition of ICMS, published in September 2019.

This user guide is intended to assist SCSI and other professionals in making use of ICMS as part of a client instruction or other relevant work. This work can be performed on behalf of or by investors, funders, clients, consultants, and contractors across all aspects of construction. For further assistance or support, please refer to Appendix 3 or visit [www.scsi.ie](http://www.scsi.ie)



# 2 | Design principles and philosophy



## 2.1 Objectives

ICMS are principles-based international standards that set out how to classify, define, measure, record, analyse, present and compare construction project life cycle costs in a structured and logical format. Although life cycle costs include only construction, renewal, operation, maintenance and end of life costs, ICMS also makes provision for including acquisition costs, which may significantly impact a project's budget.

Although life cycle costs are crucial, the primary interest of ICMS user remains in construction costs. ICMS is therefore designed to accommodate users who have an interest only in construction costs as well as those who deal with life cycle costs. ICMS is the first step in creating a seamless, global, hierarchical classification of construction and other life cycle costs: from high-level global cost benchmarking to a granular, local cost measurement perspective.

The International Standards are a suite of documents<sup>1</sup> covering the measurement and measurement reporting of land and property in various ways. Until such time as each International Standard is wholly incorporated into the SCSI's policy documents it is recommended that in instances where geospatial measurements are required and or used that full consideration is given to Appendix 4.

Assumptions around geospatial accuracy and or consistency must not be made – accuracies and scale must be stated, together with the date on which the measurement took place. For example, master planning drawings may be done at a scale (e.g. 1:2500 or Band I) that is inconsistent and incompatible with detailed design (e.g. 1:100 or Band E), yet neither are wrong they are both suitable for different purposes. The land or property may need to be remeasured at the appropriate scale if required for more a more detailed design and or measurement for costings.

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<sup>1</sup>IPMS, ICMS, ILMS

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## 2.2 Why is it important?

As property, construction and infrastructure industries continue to be increasingly global in content and operation, there is a real need for international consistency in the interpretation of something as fundamental as the classification of construction and other life cycle costs. Historically, these processes have followed local and regional custom and practices, which has made global comparison challenging, leading to confusion, uncertainty and lack of confidence from key stakeholders.

## 2.3 Addressing both buildings and civil engineering

ICMS deals with the classification of construction and other life cycle costs across buildings and civil engineering (infrastructure) projects.

'Buildings' are defined in ICMS as 'a construction with a cover and enclosure to house people, equipment or goods' and include all functional types, such as residential, offices, retail and industrial. The definition of which functional type applies is then set out in the relevant description of the project.

Civil engineering and/or infrastructure projects are presented as separate project classifications, each defined by their principal purpose. The project classifications identified in the first edition of ICMS included:

- roads
- railways
- bridges
- tunnels
- waste water treatment works
- water treatment works
- pipelines
- wells and boreholes
- power-generating plants
- chemical plants and
- refineries.

In ICMS 2, two further project classifications have been added

- dams and reservoirs and
- mines and quarries.

For each project classification, the definition of the functional type that applies (for example: bridges, roads, rail, etc.) is then set out in the relevant description of the project.

The reason for the separate classification of civil engineering projects and buildings in ICMS is because the characteristics and purpose of each are different enough from each other to warrant separate sections. On the other hand, any differences in the functional types for each project can be captured in the project attributes section. One of the strengths of ICMS is that it treats buildings and each separate class of civil engineering project in the same structured approach.

## 2.4 Projects and subprojects

A 'project' is considered as a standalone segment of construction work where the cost classification can be presented for that building or civil engineering segment of work. A project can also be a 'wrapper' (i.e. programme) for a series of 'Sub-Projects', where each subproject is distinct and comprises part of the overall development. For example, a multi-lane highway might be a project that is split into separate sub-projects for carriageways, a subproject for a tunnel and a subproject for each of the bridges comprising part of the highway.

On the other hand, a building designed and built for multi-use purposes, such as a tower built for mixed-use development that contains residential, commercial office space, retail and hotel accommodation, would be considered a single project. The definition and modelling of projects and sub-projects remains flexible in ICMS and may vary from situation to situation. For a better demarcation of projects and sub-projects, users can refer to the classification for allocation into projects, programs and portfolios.



# 3 | Structure, cost framework and hierarchical levels



## 3.1 Structure

The second edition of ICMS is divided into four parts.

- **Part 1: Context** – provides an introduction and sets out the aims of ICMS.
- **Part 2: ICMS Framework** – illustrates the relationship between the first and second editions of ICMS and between whole life costs and life cycle costs. ICMS is consistent with ISO 15686-5: whole life costs comprise non-construction costs, income and externalities and life cycle costs, which in turn comprise construction, renewal, operation, maintenance and end-of-life costs.
- **Part 3: Project Attributes and Values** – these describe the major features of a project or subproject that might impact its cost. Their purpose is to ensure that, as far as possible, like is compared with like.
- **Part 4: Definitions** – definitions of life cycle costs are consistent with ISO 15686-5. Section 4.2 contains guidance on the allocation of the costs between substructure and structure. Section 4.2.2 contains a sample set of diagrams on the suggested delineation point between substructure and structure for buildings and a selection of civil engineering works, enabling the relevant cost allocation to be made between substructure and structure.

The general concept and philosophy of the second edition of ICMS remains the same as the first edition of ICMS but some significant changes have been made to accommodate the inclusion of all life cycle costs. The principal changes between the first and second editions of ICMS are shown in Table 1 of this document.

Table 1: Key differences between the first and second editions of ICMS

| ICMS (1st edition)   | ICMS (2nd edition)   |
|--|--|
| Covers only initial or total capital costs.  | In addition to construction costs, it addresses acquisition, renewal, operation, maintenance and end-of-life costs. Cost sub-groups have been added for renewal, maintenance operation and end-of-life costs.  |
| Acquisition costs were included in 'Total Capital Costs'.  | Acquisition costs are classified as 'Non-Construction Costs'.  |
| 'Work and utilities off-site', 'Post-completion loose furniture, fittings and equipment' and 'Construction-related consultants and supervision' were included in 'Associated Capital Costs'. | 'Work and utilities off-site', 'Post-completion loose furniture, fittings and equipment' and 'Construction-related consultants and supervision' are included in 'Construction   Renewal   Maintenance Costs'. References to 'Associated Capital Costs' have been deleted.                |
| Covers 11 types of civil engineering projects.   | Covers 13 types of civil engineering projects: 'Dams and Reservoirs' and 'Mines and Quarries' have been added.   |
| 'Project Attributes and Project Values for Each Type of Project and Sub-Project' were included in Schedule 1.  | 'Project Attributes and Values' have been transferred to Part 3.   |
| 'Substructure and Structure Delineation for Each Type of Project and Sub-Project' were included in Schedule 2.   | 'Substructure and Structure Delineation' have been transferred to Part 4, section 4.2.   |
| Definitions were included in Part 1.   | Definitions have been transferred to Part 4, section 4.1.<br><br>Appendices have been modified to reflect the inclusion of all life cycle costs. Two appendices have been added:<br><br>Appendix H – ICMS Coding Structure and<br><br>Appendix J – Revision Notes for ICMS, 2nd edition. |

In addition, the second edition of ICMS contains a new section in Part 2 (section 2.4) – 'Life Cycle Cost Considerations' – where project attributes and values have been generally amended to take account of the inclusion of all life cycle costs.

### 3.2 Cost framework, hierarchical levels and attributes

Figure 2 in section 2.1 of ICMS provides an overview of the ICMS framework with various cost classification levels, the component parts of which are explained in this guide.

Figure 2: ICMS Framework including level 1 Projects and Sub-Projects

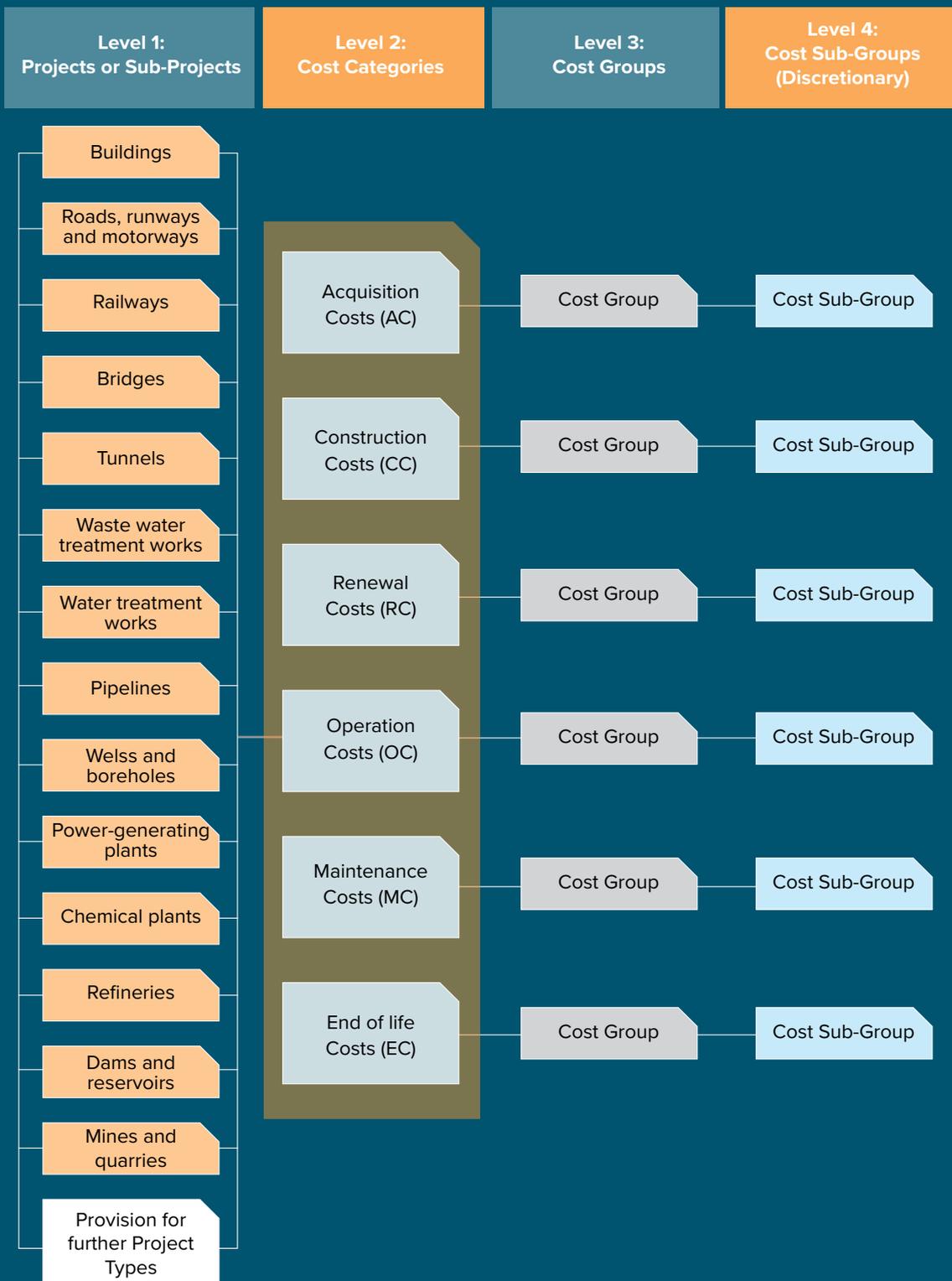




Figure 3 in section 2.2 of ICMS sets out the hierarchical structure of ICMS. Section 2.2 of ICMS also provides a brief set of notes that describe the four levels of the framework:

- level 1: project or subproject
- level 2: cost categories
- level 3: cost groups and
- level 4: cost sub-groups.

Table 2 of ICMS provides a detailed description of the scope or ‘coverage’ intended to be classified within the relevant level 3 cost groups under each of the six cost categories at level 2, which are as follows:

- acquisition costs (AC)
- construction costs (CC)
- renewal costs (RC)
- operation costs (OC)
- maintenance costs (MC) and
- end of life costs (EC).

In Table 2 of ICMS, such ‘coverage’ is common to both buildings and civil engineering projects and is mandatory and standardised for all projects, irrespective of type or function. For convenience, a reminder of the colour coding is provided at the top of each page: turquoise for acquisition costs, light blue for construction costs, and light grey for renewal, maintenance, operation and end of life costs. Each of the cost groups within Table 2 of ICMS has a primary cost code number (for example, 1.01, 2.01 and 3.01), which are mandatory and will better facilitate digital analysis. Further suggested (non-mandatory) cost sub-group cost codes are given in Appendices A–E of ICMS.

Each category may be used separately or in conjunction with other categories. Thus, life cycle costs are the sum of all six categories, while initial capital costs are the sum of acquisition and construction costs. The capital cost budget may be the capital plus renewal costs.

The definition of level 3 cost groups is set out in Table 2 of ICMS. The cost groups at level 3 are mandatory and should not be changed, deleted, or added to – the cost adviser is required to ensure that all the costs to be classified are included somewhere within this framework at level 3. No delineation diagrams are given (for example, between structure and non-structural works) and accordingly the cost adviser is to use



appropriate judgement for such decisions, based on the scope description contained within Table 2 of ICMS.

Level 4 cost sub-groups are intended to capture further sub-divisions of cost within each of the level 3 cost groups, thereby providing an even more granular level of detail of cost classification. Examples of what might be included in level 4 cost sub-groups are provided in Appendices A–E of ICMS. More detail is provided in section 3.2.4 and Appendix 2 of this guide. The level 4 cost sub-groups are discretionary and can be formulated to suit local custom and practice.

Further information about the hierarchical levels is provided in the following sections.

### 3.2.1 Level 1: project or subproject

This category relates to either buildings or projects classified as civil engineering or infrastructure individually, although the treatment of both types is the same.

In the case of buildings, the description of the functional type of the building under consideration is given in the project attributes for the ‘Works’ in part 3 of ICMS. A selection of sample building functional types is given in Table 4: Buildings in part 3 of ICMS. There is also the opportunity to add any other functional types that are not specifically listed.

In the case of civil engineering or infrastructure type projects, there are 13 classified types, which are listed in Table 1 of ICMS. These are considered the most common infrastructure type projects that typically exist, though ICMS coalition may add further project types. For each classification, a selection of sample functional types is provided in Tables 5–17 of ICMS (such as tunnels for road, rail, or pipeline). Again, ICMS provides the opportunity to add any other functional type not specifically listed.

Appropriate skill and judgement are needed by the cost adviser if the building being cost classified (e.g. a shopping centre, railway station or airport terminal) contains within the development an element of surface access roads and car parking. In principle, it is suggested that unless they are of significant scope, the cost of roads and car parking is included within the building cost classification (within the ‘external works’

cost group) rather than being classified as separate projects. However, the decision about whether an element within a ‘building’ should be considered a separate subproject may depend on whether the client is concerned only with construction cost or with whole life costs.

Further consideration should be given by the cost adviser as to whether, for example, a small ancillary structure within a larger project should merely be considered as part of the whole, or whether it should be placed into – and cost reported as – a separate subproject. Again, the decision will be influenced by whether construction or life cycle costs are to be considered. Given that ICMS is intended to be a high-level framework model, it is impossible to provide meaningful guidance on the multitude of variants that will exist. Similarly, if the civil engineering project of one classification contains a minor amount of work in other classifications (e.g. minor lineside buildings and access roads to a railway), these may be included within the external work cost group rather than being classified as separate projects.

### 3.2.2 Level 2: cost categories

These are individual categories that provide for a suitable split or classification of the overall project cost into six level 2 cost categories:

- acquisition costs
- construction costs
- renewal costs
- operation costs
- maintenance costs and
- end of life costs

This is conveniently represented by the mnemonic ACROME. The sum of the last five of these six subgroups is the life cycle cost. The level 2 cost categories and level 2 cost groups are listed in Table 2 of this document. The cost categories can be described as follows.

**Acquisition costs** are defined in ICMS as:

*‘All payments or considerations required to acquire/lease/purchase the land, property or existing Constructed Asset, and all other expenses associated with the acquisition, excluding physical construction.’*

This includes administrative, financial, legal and marketing expenses incurred from inception to commissioning the project. Cost advisers may not be aware of the site acquisition cost incurred by the client, or the site may have been within the ownership of the client for some time, so appropriate notes should be added to the project attributes section to make clear the status of the site purchase cost. Do not include in this cost group the current open-market valuation of the site as an asset – this is not relevant to this cost classification framework.

**Construction costs** are typically the total cost of the project expenditure paid by the client to the constructor, as set out in the business case, budget, or construction contract(s). There may be separate sets of construction costs that make up the total if more than one constructor is retained, depending on the procurement model chosen.

**Renewal costs** are the costs incurred in renewing major components of a project or subproject during its life (such as boilers and air-conditioning units) that the client wishes to include in the capital cost budget. They exclude the costs incurred in renewing minor components such as light bulbs or bearings in pumps.

**Operation costs** are defined in ICMS as

*‘Costs incurred in running and managing a Constructed Asset, including administrative support services, rent, insurances, energy and other environmental/ regulatory inspection costs, taxes and charges.’*

They have been expressed in eight level 3 cost groups, as described in section 3.2.3 of this guide.

**Maintenance costs** are the total costs of labour, material and other related costs incurred to ensure that a constructed asset remains in a state in which it can fulfil its required functions.

They include corrective and preventative maintenance, such as cleaning, services, repainting, repairing or replacing parts that are not classed as renewal and that the client wishes to be included in the maintenance budget. They also include the maintenance contractor's site overheads, risk allowances and taxes and levies.

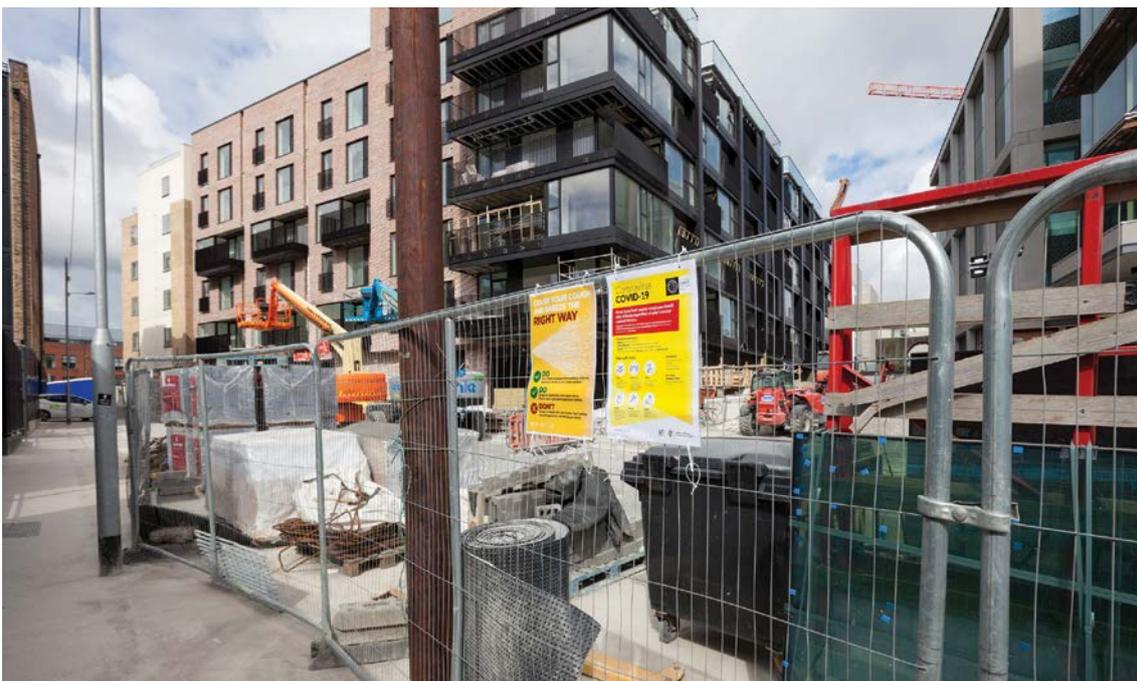
**End of life costs** are the net costs or fees for disposing of an asset at the end of its service life after deducting the salvage value and other income due to disposal, including costs resulting from:

- disposal
- inspection
- decommissioning and decontamination
- demolition and reclamation
- reinstatement
- asset transfer obligations
- recycling
- recovery
- disposal of components and materials and
- transport and regulatory costs.

They include all constructors' site overheads, risk allowances and taxes and levies.

Occupancy costs – such as reception, library, portage, etc. – arise exclusively as a result of the occupation of a constructed asset. They are specifically excluded from the operation cost category, since they are part of non- construction costs, which form part of whole life costs, rather than life cycle costs, and which may be included in the cost report if required by the client. There is the potential for overlap between operation and occupancy costs, for example in the security of an unoccupied building (operation cost) or security in an occupied building (occupancy cost) and some clients may require occupancy costs to be included in operation costs.

If the client's interest is confined to capital costs, then the sum of the first two cost categories apply: acquisition costs and construction costs. If the client's interests embrace life cycle costs, then the sum of all six cost categories apply. The cost adviser must ensure that in each case, all costs are included in one of the relevant cost categories. In other words, the total cost of each category or group is the sum of its cost components at the level below, plus any cost allocated at that level, and is not to be further broken down.



### 3.2.3 Level 3: cost groups

At level 3, each of the six cost categories is broken down into cost groups to provide a more detailed breakdown in each case.

Acquisition costs are divided into two cost groups. These cover all the costs associated with purchasing or hiring the site or existing asset (if known or released by the client) and all expenses incurred by the client on non-direct construction activities undertaken by lawyers, marketing people, sponsors, etc. If the site acquisition costs are not known, then the cost adviser should make this clear within the various notes included with the cost classification plan or report. It is suggested that for consistency in data systems, this information should have a well-defined location.

Construction costs are classified into thirteen separate level 3 cost groups, in order to capture all the construction costs (in seven groups) together with three groups for:

- preliminaries
- risk allowances (contingency) where the client chooses to retain the risk allowance outside the parameters of the construction project and
- taxes/levies.

A further three groups capture:

- work and utilities off-site
- post completion loose furniture, fittings and equipment and
- construction-related consultancies and supervision.

These last three were included in associated capital costs in the first edition of ICMS. Design fees incurred and paid for by the constructor should be included elsewhere within the construction costs, with a suitable note added to the attributes section.

It is acknowledged that the use of only seven directly related construction cost groups for the classification of all the construction cost will be fewer than many historic construction cost classification systems or databases have in place. However, it should be remembered that further and more detailed cost classifications can be given at level 4 within the various cost sub-groups.

In the case of taxes/levies and where local mandatory tax is applicable as an addition to the cost of the construction works, but which by custom and practice have been excluded from any cost classification system, the cost adviser should ensure that it is clear that such mandatory tax is included within the cost classification and the total cost of the project. This is the case even though the tax status of the client and the local tax rules may mean that the tax incurred is recovered by the client at a later date. In addition, it should be made clear in the attributes section if the client does not have to pay such tax.

The inclusion of the cost of loose furniture, fittings and equipment is intended to capture the cost of those items that are added to the completed project after completion of the construction works. However, the cost adviser should take into consideration the fact that these items may be installed prior to the completion of construction works.

Careful consideration needs to be given to items of cost that are linked to the project but are not properly to be considered as construction works (e.g. the new rolling stock for a railway or the process plant for a production facility). The cost adviser must make the overall status of these items clear within any project cost report.

Renewal and maintenance costs share the same level 3 cost groups as construction costs. This reflects the fact that items requiring renewal and maintenance are likely to be those that are included in level 4 construction cost sub-groups, and therefore wrapped up into level 3 cost groups. It is also recognised that maintenance costs in particular may not be available at level 4 or even level 3 and may, for example, simply be expressed as a percentage of construction costs.

Operation costs are classified into eight level 3 cost groups. The first five are:

- cleaning
- utilities

- waste management
- security and
- information and communications technology.

These capture all the activities and services required to operate a constructed asset.

The last three are:

- operators site overheads
- risk allowance and
- taxes and levies.

These are common to all cost categories except acquisition costs.

End of life costs are divided into seven cost groups. The first four reflect all the potential activities involved in exiting the project or subproject:

- disposal inspection
- decommissioning and decontamination
- demolition, reclamation, and salvage and
- reinstatement.

The last three cost groups are the usual constructor's site overheads, risk allowances and taxes and levies.

### 3.2.4 Level 4: cost sub-groups

ICMS includes a set of suggested cost sub-group codes and descriptions, which it is recommended are followed wherever possible.

If a cost incurred on the project is not listed within the sample selection provided at level 4, then the cost adviser should add a suitable item and cost code in a logical manner, taking account of the remainder of the coding within that cost group. These sample selection details are contained within five appendices in ICMS, as follows:

- **Appendix A – Acquisition Costs Sub-Groups:** common to all types of project where the functional type is defined in the project attributes elsewhere.
- **Appendix B – Construction | Renewal Maintenance Costs Sub-Groups:** Buildings: where the functional type is defined in the project attributes elsewhere.
- **Appendix C – Construction | Renewal | Maintenance Costs Sub-Groups:** Civil Engineering Works: the classification appears in the form of a table or matrix, where the relevant level 4 cost sub-group item is 'dotted' to indicate that it is relevant to that particular type of civil engineering works.



- **Appendix D: Operation Costs Sub-Groups:** common to both buildings and civil engineering works.
- **Appendix E – End of Life Costs Sub-Groups:** common to all types of project where the functional type is defined in the project attributes elsewhere.

### 3.3 Project attributes and values

Part 3 of ICMS presents a suggested model for the standard presentation of the key information about the project so that cost advisers (and others) can make judgements and comparisons between different projects in respect of time, size, quality, location, market conditions and any other relevant information that would assist other advisers. Following brief introductory notes, there are two separate sets of attributes and values. The first set, contained in Table 3 of ICMS, are common to all projects, while the second set, contained in Tables 4 to 17 of ICMS, are specific to buildings and each of the 13 civil engineering works types.

The common attributes and values provide for general information about the project (which could be considered as non-technical) in areas such as:

- real-time date and project stage status
- currency and exchange rate
- programme information and
- site conditions and procurement model adopted

together with information relevant to life cycle costs, such as the discount rate and expected life span.

Sample project values are given, and cost advisers should use appropriate skill and judgement to select the 'best-fit' value or add to and adapt that which is offered to suit the circumstances of the project and local custom and practice. At the same time, they should also seek to retain the suggested structure and form as best as possible.

The specific attributes and values are split into each of the 14 separate project types – 1 for buildings generally and 13 for each of the civil engineering works types – and these could be considered the technical information. This information seeks to capture the key and specific design-based data about the project together with the key quantities.

With respect to quantities under the 'buildings' section, it should be noted that the gross external floor area (IPMS 1 External) and gross internal floor area (IPMS 2 Internal) are cross-referenced with the International Property Measurement Standards (IPMS) definitions (see Appendix I of ICMS ). Cost advisers should satisfy themselves that they are aware of the provisions of IPMS to report against this attribute (or be aware that any quantities provided to them by others have also been prepared in that format).

Values required to be quoted within the project attributes (part 3 of ICMS) should be defined and given to an appropriate level of detail, to give a general indication of the scale and size of the project.

It is suggested that the currency used for reporting should be the local currency relating to the payments made for the project. It is therefore important that the project attributes capture both the real-time details (when the project was undertaken) as well as the exchange rate applicable at the base point in time for the relevant report so that meaningful currency conversion can be made for comparison purposes. This is of particular importance where the project has a long construction period and various packages may be procured at different times.

However, certain clients may require all reports and costs to be reported in their own local corporate 'trading' currency and appropriate dual reporting of costs may be necessary. Consideration should be given to the possibility that projects are reported on a common currency basis (say US\$ or a suitable interbank rate). It is important for the purposes of life cycle costing that all assumptions are clearly and comprehensively stated. In this respect, the discount rate used to derive net present values, the assumed life of the asset and the base date are key attributes to which values should be assigned. Further guidance is provided in section 4 of this user guide.

# 4 | Life cycle cost considerations



Figure 1 in ICMS demonstrates the difference between whole life and life cycle costs. In addition to life cycle costs, whole life costs include income streams and non-construction costs such as finance, business income from sales and disposals, occupancy costs and externalities. Externalities are defined in part 4 of ICMS as:

*‘Quantifiable cost or benefit that occurs when the actions of organisations and individuals have an effect on people other than themselves, e.g. non-construction costs, income and wider social and business costs (ISO 15686-5)’.*

Section 2.4 of ICMS provides guidance about how life cycle costing should be carried out. It emphasises the importance of agreeing the scope of the life cycle costing (especially what is included and excluded) with the client before costing starts.

The scope should also define the level at which life cycle costs will be calculated and reported. There may be some problems in accessing renewal, operation and maintenance data at level 4 or even level 3. ICMS recognises this challenge by allowing the reporting of life cycle costs at a higher level (e.g. level 2 or even level 1), than the level at which, for example, construction costs are reported (which may be at level 4).

Section 2.4 of ICMS also provides guidance on the expected asset life. This may be the design life, service life, economic life, anticipated physical life or any other period agreed with the client from the outset.

Guidance is also provided on how life cycle calculations should be carried out. For options appraisals, it recommends the use of net present value and indicates how this should be calculated. In Figure 4 of ICMS, a new term, the ‘common date’ is introduced. It is defined as the date to which all future cash flows are discounted or compounded and it occurs after completion. It should be distinguished from the ‘base date’, which is defined as ‘The date at which individual Construction Costs in ICMS cost reports apply exclusive of Price Level Adjustments after that date.’ It is the date from which any agreed changes in conditions or prices are calculated.

Life cycle costing is not a straightforward process, and cost advisers should ensure that they are sufficiently familiar with the underlying practice and theory before embarking on a life cycle costing exercise.

In particular, judgement is required in the choice of discount rate, asset life, renewal dates, the level of detail at which the costs should be expressed, and how the asset will be operated and maintained.

# 5 | Other ICMS appendices



This section of the document sets out the remainder of the appendices contained within the ICMS which are in addition to those referenced within section 3.2.4 Level 4: cost sub-groups above.

The other appendices in ICMS are described below.

- **Appendix F – Process Flow Charts:** a selection of process flow charts to assist cost advisers (and others) in formulating a structured approach to producing a cost classification model or report for a project and to ensure that all cost aspects of the project are adequately captured.
- **Appendix G – Reporting Templates:** a set of suggested templates for construction, capital and life cycle costs for building and civil engineering projects and subprojects, for the grand total, and for comparing between two different design schemes (noting that this only contains the financial material, and the text and notes in respect of the project attributes and project values needs to be added). They can be used for:
  - the cost classification of a project in its own right
  - the cost classification between two different project design schemes (for option appraisal purposes, but only in respect of the capital cost and not developed tools such as cost benefit analysis) and.
  - the cost classification for a project with a selection of subprojects.

While these reporting templates are paper-based models as published in the first edition of ICMS, it is expected that digital models or templates will be prepared by software vendors or independent organisations.

- **Appendix H – ICMS Coding Structure:** a detailed but discretionary cost coding system is provided for all items and it is suggested that this is followed whenever possible, although it is likely that future products, published by RICS and others, will represent these in a formal structure. There is also a set of general notes that are applicable to appendices A and B, which are intended to clarify and define coverage and allocation where applicable.
- **Appendix I – Interface with International Property Measurement Standards (IPMS):** For reporting purposes, cost advisers are required to state the relevant areas of the project by reference to the relevant definition within IPMS and this appendix sets out applicable notes. It should be remembered that as at the publication date of ICMS, IPMS continues to be developed across four key functional project types (offices, residential, industrial and retail).
- **Appendix J – Revision Notes for ICMS, 2nd edition.**
- **Appendix K – Bibliography.**



# 6 Uses



Applications of ICMS include, but are not limited to, those discussed in the following sections. Notwithstanding the specific uses noted below, ICMS can be used for cost reporting and analysis at any stage of a project life cycle, including inception, design, procurement, construction and post-asset use.

## 6.1 Early conversations

Cost advisers who are intending to use ICMS will likely have an early conversation with the end user of the report or other piece of work to explain the benefits of reporting costs in this manner.

## 6.2 Benchmarking and cost reporting

Cost advisers will provide construction cost information and recommendations to their clients at various stages throughout the life cycle of each project. ICMS will be an essential tool in this process. In addition, informed clients need robust data and reporting for benchmarking to assess the financial viability of their projects. They may also need to consider various options to ensure that the design solution chosen offers best whole life value for money. Increasingly, this is becoming a requirement of government procurement in some countries.

Firstly, when providing benchmarking and order-of-cost estimates of the likely construction or life cycle cost of a project, the cost adviser will use appropriate skill and judgement to provide and use costs based on measurements such as an approximate area or key functional parameters, e.g. length or capacity, against the relevant project type. This base figure will be drawn from historic cost data, held either by the cost adviser or accessible from published sources. If the historic cost data and classification have been prepared using ICMS, the base figure will have a common source basis.

This high-level cost estimating by the adviser will still need to be adjusted in the usual way for external environmental factors such as geography and real time, and to take account of the size and scale of the project. It will also need to consider differences in maintenance, operation and end of life regimes, which in turn would affect the frequency and magnitude of any required renewals.

Secondly, when providing the client with more detailed estimates, procurement evaluation and post-contract and post-commissioning financial reporting, there will be a clearer means to compare different cost models and run what-if scenarios for any change in circumstances. This is particularly important in life cycle costing, which should be repeated at regular intervals as more is learned about the behaviour of the asset and the way it is operated and maintained.

Thirdly, at the end of the project, there will be a need to capture the actual cost of the scheme, which serves to provide the basis of the final cost reporting to the client, and for the individual project costs to be added to a database for reference and future use.

Equally, throughout the life of the project life cycle, costs should be captured and added to a database, both to track the performance of the asset throughout its life and to respond suitably to any changes, and also to improve the accuracy of forecasting with which life cycle costs can be predicted for future projects.

In all cases, it is envisaged, at least initially, that ICMS cost reporting may run alongside other methods of reporting demanded by the client or the market. This should not be seen as inconsistent, provided costs can be easily mapped between the two methods of reporting using software solutions and professional interpretation.

### 6.3 Cost classification and analysis

As well as providing a high-level cost reporting tool, ICMS also has a cost classification function, such that individual cost categories, groups or sub-groups (if applicable) are set out, tabulated and totalled to arrive at the overall construction or life cycle cost.

This will enable the cost adviser (at the stage of the project in which the business case is outlined) to critically challenge the cost of any individual cost category or cost group if it seems to be significantly at variance with other current or historic data for that cost category or group.

In addition, this classification function will be used by the cost adviser to prepare tender enquiry pricing documents so that tender returns – not only for construction costs, but for renewal, operation, maintenance and end of life costs too – can be interrogated and informed evaluations made between bids on a common basis.

Critically, the standard classification will allow the collection of global construction and life cycle cost data to better inform cost comparison between markets and cost prediction of future schemes.

### 6.4 Claims analysis and forensics

Cost advisers are also involved in the demonstration of proof of entitlement to recovery of costs incurred within a dispute or 'claims' environment. The use of ICMS on the project will ensure that the both the construction and the life cycle project costs are classified in a recognisable manner, thereby providing greater confidence over the validity of the claim. Proving reasonable cost or providing the cost history of a project will also be more easily undertaken with the adoption of ICMS.

### 6.5 Work breakdown structures

Work breakdown structures are common methods of classifying works in civil engineering. ICMS has been designed to work with these structures so that cost and time, at high level, can be classified in the same way. An example is shown in Appendix 1 of this user guide.

### 6.6 BIM models

ICMS is designed to be used, if applicable, with BIM models. Project values and attributes are designed to be used with dropdown lists to ease data input and subsequent analysis. It should be noted, however, that almost all BIM models are classified according to a number of global systems such as Unifomat II, OmniClass, UniClass, MasterFormat and there may need to be an element of mapping between them and ICMS.

# 7 | Limitations



## 7.1 Measurement Detail

Although ICMS contains the word ‘measurement’ in its title, it is a construction and life cycle cost classification tool and therefore does not require detailed measurement of construction quantities to the level required by example, “The Agreed Rules of Measurement (ARM) or the Civil Engineering Standard Method of Measurement (CESMM) . However, there are project quantities stated in ICMS that should be set out in the details of each project. These need to be as accurate as the level of detail provided and are dependent on the work stage of the project , noting cost reporting is required from early feasibility stage through developed design, construction stage and on into the life span of the completed project up to end of life cost. The more developed the project, the more detailed will be the information available and therefore the more accurate the level of measurement required. The cost adviser should use appropriate skill and judgement to arrive at a suitable level of accuracy for such quantities.

For example, the ICMS Project Quantities for a building would include:

| Project Quantities   | Possible Method of Calculation   |
|--|--|
| Site area (within legal boundary of building site, excluding temporary working areas outside the site)   | From the extent shown on the legal folio map of the site   |
| Gross external floor area as IPMS 1 (EXTERNAL)   | International Property Management Standard (IPMS)  |
| Gross internal floor area as IPMS 2 (INTERNAL)   | International Property Management Standard (IPMS)  |
| Functional units e.g. number of occupants / number of bedrooms / number of hospital beds / number of hotel rooms / number of car parking spaces / number of classrooms / number of students / number of passengers / number of boarding gates / other stated | <ul style="list-style-type: none"> <li>• From client brief at Feasibility Stage</li> <li>• From drawings at later stages of development</li> </ul> |

Whilst, the ICMS Project Quantities for a tunnel would include:

| Project Quantities   | Possible Method of Calculation  |
|--|---|
| Length (end to end)  | <ul style="list-style-type: none"> <li>a) From the extent shown on the map of the proposed project at Feasibility Stage</li> <li>b) From drawings at later stages of development</li> </ul> |
| Volume of excavation   | Calculated in accordance with Class T: Tunnels of CESMM4  |
| Functional units (capacity) e.g.(vehicles / litres / gallons / tonnes / tons per hour) | <ul style="list-style-type: none"> <li>• From client brief at Feasibility Stage</li> <li>• From drawings /specifications at later stages of development</li> </ul>                          |

## 7.2 Currency and specification

No single currency is used as the basis of cost classification in ICMS, as this is intended to be expressed in the local currency of the location of the project and/or the currency that was used in the transaction. That stated currency will then be added as a project-specific value by the cost adviser, together with the base date of the costs. This is so that subsequent users of the cost data can reference the exchange rate for that currency at the time of the project and make suitable adjustments for the fluctuation in the exchange rate since that date. See section 3.2 of this guide for more information about the reporting of costs in a common currency.

While there are limitations to the accuracy of exchange rate comparisons over time, it should be borne in mind that the use of purchasing power parity measures, while more accurate, would be more labour-intensive.

The specification (or quality) of the project will also be given as part of the project values, but this should only be an approximate indication of the general level of specification in each project, rather than a detailed description of each cost group. This is so that subsequent users of the cost data can form a reasonable judgement of the adjustment in cost required when producing an estimate based on the historic cost data and normalising it for the perceived difference in specification or quality.

## 7.3 Extent of coverage – civil engineering

As already noted, ICMS covers 13 common civil engineering (infrastructure) project types and it is considered that these project types cover much of the infrastructure output. Should the demand arise, further infrastructure project types may be added into subsequent editions of ICMS.

## 7.4 Availability of life cycle data

Life cycle costing is in its infancy in many countries. As a result, little historic data is available and that which is available is not collected in any consistent way. Different clients, contractors, consultants, facility managers and cost advisors may collect data in different formats from different sources using different cost breakdown structures and different scopes (i.e. what is included and what is excluded). It is hoped that ICMS will help to rectify this situation and lead to consistency, where robust data can be used and preferably shared to introduce more certainty into the prediction and control of construction and other life cycle costs.

# 8 Differences from elemental cost planning



## 8.1 Classification principles

ICMS has been developed at level 4 as an elemental cost breakdown structure principally because this is required for life cycle costing. This elemental cost breakdown is needed because the maintenance and renewal costs are generally allocated at the elements and the systems level. However, the classification of construction and other life cycle costs as set out in ICMS differ from other historic elemental cost plan structures, layouts and formats, given that the traditional elemental titles and groups for cost classification do not necessarily apply globally. The ICMS Coalition aimed to create a cost framework that can be understood by all parties, hence the use of classification groups with titles such as cost categories, cost groups and cost sub-groups.

## 8.2 Substructure and structure delineation

Different parts of the world have historically applied different 'boundaries' to where the 'substructure' and 'structure' (also known as 'superstructure') starts and ends, and these differences are also evident in the boundary applied between structural designers (engineers) and quantity surveyors or cost advisors.

It is important that a single common approach is taken, so that when project cost classifications are prepared, the same principle is applied in each case, based on the sample diagrams as presented in section 4.2 of ICMS such as figures 5 and 6. This also serves to align with how 3D models of the building or structure are constructed.

## 8.3 Loadbearing and non-loadbearing delineation

Again, historic custom and practice in different parts of the world have led to different approaches being adopted to the definition of loadbearing and non-loadbearing structures and the resultant allocation of costs between the two elements or sections. ICMS seeks to define what a 'structure' should include, and it is

Figure 5

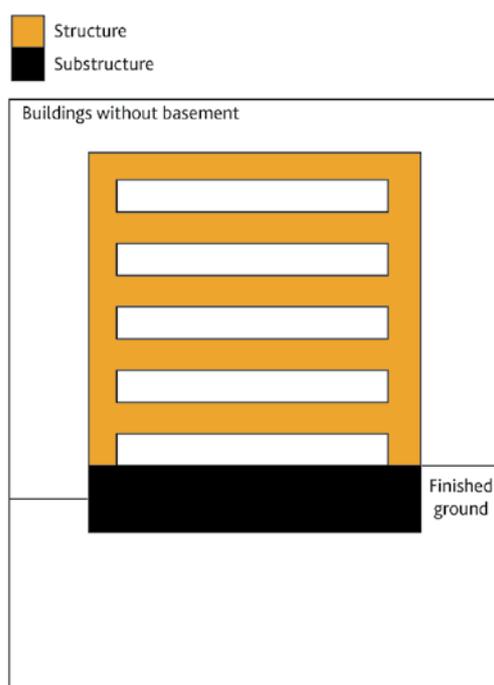
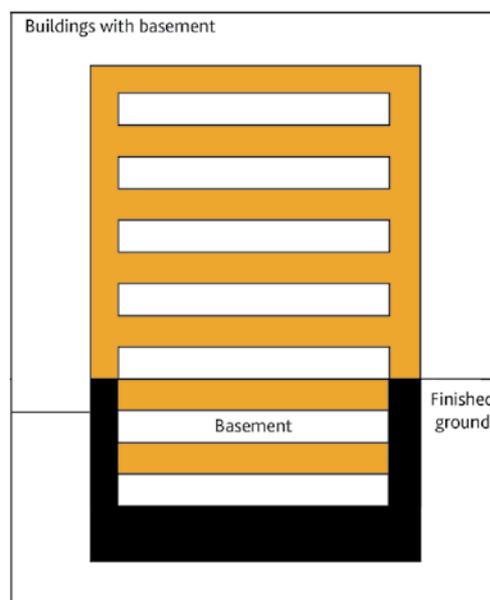


Figure 6



worth noting that the inclusion of non-load bearing components, which are an integral part of the composite load-bearing work, should be included in the 'structure' cost allocation. This reflects the characteristics of some off-site manufactured modules.

Given that there is going to be an element of uncertainty over the actual contribution that non-load bearing components make to the integrity of the load-bearing component, quantity surveyors and cost managers will be required to use appropriate skill and judgement over the allocation. A good example of this might relate to external walls, with the need to define in the project attributes the proportion of the façade that is glazed. However, this level of detail may not be known to any degree of confidence at the early stages of a project.

Quantity surveyors and cost advisors may need to seek advice from structural designers (if appointed as part of the design team) to establish which construction elements are loadbearing or non-loadbearing, given that this is not always clearly evident from the design information.

## 8.4 Alignment to design disciplines

The cost classification grouping, as set out in the ICMS framework, seeks to align the various cost groups with the design discipline (and therefore individual members of the design team) that will stand behind the defined work, such that within section 2.2 of ICMS, 'Hierarchical Levels', there are seven 'work-based' groups, namely:

- demolition
- substructure
- structure
- architectural and non-structural works
- services and equipment
- drainage (above and below ground) and
- external and ancillary works.

It is acknowledged that these seven groupings do not necessarily align with the 'packaging up' and the procurement of construction work in any market, but rather that the groups better align with the design discipline that undertakes the work in question.

# Appendix 1: ICMS example

The worked example in Table 2 shows how ICMS cost categories and sub-cost groups are typically used. It provides transparency on the capital costs and the other life cycle or facility management costs in a format that enables easy comparison for analysis and benchmarking by cost categories and by sub-cost groups. This supports identification of the option that provides the best value for money, in terms of the total life cycle cost, as well as setting the forecast budgets for running the facilities over the defined life cycle period, in this case 30 years.

**Table 2: Worked cost breakdown of two project life cycle options for an air-conditioned office**

| ICMS breakdown   |                                    | Alternative 1  | Alternative 2   | Cost variance           |
|--|------------------------------------|--|---|-------------------------|
| Cost categories/<br>sub-cost groups                    | Cost code                          | Base date Q1 2020,<br>new build base case<br>option, IPMS 2<br>Internal = 12,000m <sup>2</sup> | Base date Q1 2020,<br>acquire/fit-out<br>alternative option,<br>IPMS 2 Internal<br>= 11,800m <sup>2</sup> |                         |
| <b>Acquisition costs</b>                               | AC                                 | Land not included  | €18.5m (excluding<br>–€18.5m finance)   | –€18.5m                 |
| <b>Construction costs</b><br>(cost plan no. 1)         | CC<br>(as cost plan)               | €25.5m   | €5.5m   | €20m                    |
| <b>Renewal costs</b><br>over the 30-year<br>life cycle | RC; aggregated<br>(no discounting) | €6.3m  | €6.5m   | –€0.2m                  |
| Operation costs  |                                    | Forecast (30 years):   | Forecast (30 years):  | Forecast<br>(30 years): |
| Cleaning   | 4.01                               | €8.5m  | €8.3m   | €0.2m                   |
| Utilities  | 4.02                               | €14.6m   | €14.3m  | €0.3m                   |
| Waste<br>management                                    | 4.03                               | €1.3m  | €1.2m   | €0.1m                   |
| Security   | 4.04                               | €1.2m  | €1.2m   | €0                      |
| Comms/IT   | 4.05                               | €3.5m  | €3.2m   | €0.3m                   |
| Overhead & profit                                      | 4.06                               | included   | included  | included                |
| Risk allowance   | 4.07                               | €1m  | €1m   | €0                      |
| Taxes  | 4.08                               | Out of scope   | Out of scope  | N/A                     |

| ICMS breakdown   |  | Alternative 1  | Alternative 2   | Cost variance |
|--|--|--|---|---------------|
| Cost categories/<br>sub-cost groups                              | Cost code                              | Base date Q1 2020,<br>new build base case<br>option, IPMS 2<br>Internal = 12,000m <sup>2</sup> | Base date Q1 2020,<br>acquire/fit-out<br>alternative option,<br>IPMS 2 Internal<br>= 11,800m <sup>2</sup> |               |
| <b>End of life costs</b>   | EC                                     | Out of scope   | Out of scope  | N/A           |
| Other facilities<br>management costs<br>(option, if in<br>scope) | Facilities<br>management<br>(optional) | Out of scope   | Out of scope  | N/A           |
| sustainability<br>(BREEAM / LEED<br>rating)                      | Included in CC                         |  |   | N/A           |
| rental income  |  |  |   | N/A           |
| service charges  | Not in scope                           |  |   | N/A           |
| user-defined<br>(other costs)                                    | Not in scope                           |  |   | N/A           |
|  | Not in scope                           |  |   | N/A           |
| <b>Total life cycle<br/>cost</b>                                 | <b>LCC</b>                             | <b>€69.2m</b>  | <b>€66.9m</b>   | <b>€2.3m</b>  |

**Source:** Faithful & Gould, anonymised office project life-cycle cost plan

**Notes:** EC includes disposal inspections, reinstatement, decommissioning, salvage and taxes.



# Appendix 2

## Appendix 2: ICMS codes for buildings and civil engineering projects

| ICMS code | Cost category (level 2) | Cost group (level 3)                                  | Cost sub-group (level 4)   |
|-----------|-------------------------|---|--|
| 1.        | Acquisition costs (AC)  |   |  |
| 1.01.     | Acquisition costs (AC)  | Site acquisition                                      |  |
| 1.01.010  |                         |   | Costs and premium required to procure site   |
| 1.01.020  |                         |   | Compensation to existing occupiers   |
| 1.01.030  |                         |   | Demolition, removal and modification of existing properties by way of payment to existing owners instead of carrying out physical work |
| 1.01.040  |                         |   | Contributions for the preservation of heritage, culture and environment  |
| 1.01.050  |                         |   | Related fees to agents, lawyers, and the like  |
| 1.01.060  |                         |   | Related taxes and statutory charges  |
| 1.02.     | Acquisition costs (AC)  | Administrative, finance, legal and marketing expenses |  |
| 1.02.010  |                         |   | Client's general office overheads  |
| 1.02.020  |                         |   | Client's project-specific administrative expenses  |
| 1.02.030  |                         |   | Interest and finance costs   |
| 1.02.040  |                         |   | Legal expenses   |
| 1.02.050  |                         |   | Accounting expenses  |
| 1.02.060  |                         |   | Sales, leasing, marketing, advertising and promotional expenses  |
| 1.02.070  |                         |   | Taxes and statutory charges related to sales and lease   |
| 1.02.080  |                         |   | License and permit charges for operation and use   |
| 2.        | Construction costs      |   |  |
| 2.01.     | Construction costs      | Demolition, site preparation and formation            |  |
| 2.01.010  |                         |   | Site survey and ground investigation   |
| 2.01.020  |                         |   | Environmental treatment  |
| 2.01.030  |                         |   | Sampling of hazardous or useful materials or conditions  |
| 2.01.040  |                         |   | Temporary fencing  |
| 2.01.050  |                         |   | Demolition of existing buildings and support to adjacent structures  |
| 2.01.060  |                         |   | Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)                                 |
| 2.01.070  |                         |   | Tree transplant  |
| 2.01.080  |                         |   | Site formation and slope treatment   |

| ICMS code | Cost category (level 2) | Cost group (level 3)                       | Cost sub-group (level 4)  |
|-----------|-------------------------|--|---|
| 2.01.090  |                         |  | Temporary surface drainage and dewatering   |
| 2.01.100  |                         |  | Temporary protection, diversion and relocation of public utilities  |
| 2.01.110  |                         |  | Erosion control   |
| 2.02.     | Construction costs      | Substructure                               |   |
| 2.02.010  |                         |  | Foundation piling and underpinning  |
| 2.02.020  |                         |  | Foundations up to top of lowest floor slabs   |
| 2.02.030  |                         |  | Basement sides and bottom   |
| 2.03.     | Construction costs      | Structure                                  |   |
| 2.03.010  |                         |  | Structural removal and alterations  |
| 2.03.020  |                         |  | Basement suspended floors (up to top of ground floor slabs)   |
| 2.03.030  |                         |  | Frames and slabs (above top of ground floor slabs)  |
| 2.03.040  |                         |  | Tanks, pools, sundries  |
| 2.03.050  |                         |  | Composite or prefabricated work   |
| 2.04.     | Construction costs      | Architectural works   Non-structural works |   |
| 2.04.010  |                         |  | Non-structural removal and alterations  |
| 2.04.020  |                         |  | External elevations   |
| 2.04.030  |                         |  | Roof finishes, skylights and landscaping (including waterproofing and insulation)   |
| 2.04.040  |                         |  | Internal divisions  |
| 2.04.050  |                         |  | Fittings and sundries   |
| 2.04.060  |                         |  | Finishes under cover  |
| 2.04.070  |                         |  | Builder's work in connection with services  |
| 2.04.080  |                         |  | Composite or prefabricated work   |
| 2.05.     | Construction costs      | Services and equipment                     |   |
| 2.05.010  |                         |  | Heating, ventilating and air conditioning systems/air conditioners  |
| 2.05.020  |                         |  | Electrical services   |
| 2.05.030  |                         |  | Fitting out lighting fittings   |
| 2.05.040  |                         |  | Extra low voltage services  |
| 2.05.050  |                         |  | Water supply and drainage above ground or inside basement   |
| 2.05.060  |                         |  | Supply of sanitary fittings and fixtures (installation included in 'Water supply and above ground drainage' unless not separable from costs of 'Fittings and sundries') |

| ICMS code | Cost category (level 2) | Cost group (level 3)             | Cost sub-group (level 4)  |
|-----------|-------------------------|----------------------------------|---|
| 2.04.070  |                         |                                  | Builder's work in connection with services  |
| 2.04.080  |                         |                                  | Composite or prefabricated work   |
| 2.05.     | Construction costs      | Services and equipment           |   |
| 2.05.010  |                         |                                  | Heating, ventilating and air conditioning systems/air conditioners  |
| 2.05.020  |                         |                                  | Electrical services   |
| 2.05.030  |                         |                                  | Fitting out lighting fittings   |
| 2.05.040  |                         |                                  | Extra low voltage services  |
| 2.05.050  |                         |                                  | Water supply and drainage above ground or inside basement   |
| 2.05.060  |                         |                                  | Supply of sanitary fittings and fixtures (installation included in 'Water supply and above ground drainage' unless not separable from costs of 'Fittings and sundries') |
| 2.05.070  |                         |                                  | Disposal systems  |
| 2.05.080  |                         |                                  | Fire services   |
| 2.05.090  |                         |                                  | Gas services  |
| 2.05.100  |                         |                                  | Movement systems  |
| 2.05.110  |                         |                                  | Gondolas  |
| 2.05.120  |                         |                                  | Turntables  |
| 2.05.130  |                         |                                  | Generators  |
| 2.05.140  |                         |                                  | Energy-saving features  |
| 2.05.150  |                         |                                  | Water and waste water treatment equipment   |
| 2.05.160  |                         |                                  | Fountains, pools and filtration plant   |
| 2.05.170  |                         |                                  | Powered building signage  |
| 2.05.175  |                         |                                  | Audio/visual entertainment system   |
| 2.05.180  |                         |                                  | Kitchen equipment   |
| 2.05.190  |                         |                                  | Cold room equipment   |
| 2.05.200  |                         |                                  | Laboratory equipment  |
| 2.05.210  |                         |                                  | Medical equipment   |
| 2.05.220  |                         |                                  | Hotel equipment   |
| 2.05.230  |                         |                                  | Car park or entrances access control  |
| 2.05.240  |                         |                                  | Domestic appliances   |
| 2.05.250  |                         |                                  | Other specialist services   |
| 2.05.260  |                         |                                  | Builder's profit and attendance on services   |
| 2.06.     | Construction costs      | Surface and underground drainage |   |
| 2.06.010  |                         |                                  | Surface water drainage  |
| 2.06.020  |                         |                                  | Storm water drainage  |
| 2.06.030  |                         |                                  | Foul and waste water drainage   |
| 2.06.040  |                         |                                  | Drainage disconnections and connections   |

| ICMS code | Cost category (level 2) | Cost group (level 3)  | Cost sub-group (level 4)   |
|-----------|-------------------------|---|--|
| 2.06.050  |                         |   | CCTV inspection of existing or new drains  |
| 2.06.060  |                         |   | Buried process pipe  |
| 2.07.     | Construction costs      | External and ancillary works  |  |
| 2.07.010  |                         |   | Permanent retaining structures   |
| 2.07.020  |                         |   | Site enclosures and divisions  |
| 2.07.030  |                         |   | Ancillary structures   |
| 2.07.040  |                         |   | Roads and paving   |
| 2.07.050  |                         |   | Landscaping (hard and soft)  |
| 2.07.060  |                         |   | Fittings and equipment   |
| 2.07.070  |                         |   | External services  |
| 2.08.     | Construction costs      | Preliminaries   Constructors' site overheads   general requirements |  |
| 2.08.010  |                         |   | Construction management including site management staff and support labour                                   |
| 2.08.020  |                         |   | Temporary access roads and storage areas, traffic management and diversion (at the Constructors' discretion) |
| 2.08.030  |                         |   | Temporary site fencing and securities  |
| 2.08.040  |                         |   | Commonly shared construction plant   |
| 2.08.050  |                         |   | Commonly shared scaffolding  |
| 2.08.060  |                         |   | Other temporary facilities and services  |
| 2.08.070  |                         |   | Technology and communications: telephone, broadband, hardware, software                                      |
| 2.08.080  |                         |   | Constructor's submissions, reports and as-built documentation  |
| 2.08.090  |                         |   | Quality monitoring, recording and inspections  |
| 2.08.100  |                         |   | Safety, health and environmental management  |
| 2.08.110  |                         |   | Insurances, bonds, guarantees and warranties   |
| 2.08.120  |                         |   | Constructor's statutory fees and charges   |
| 2.08.130  |                         |   | Testing and commissioning  |
| 2.09.     | Construction costs      | Risk allowances   |  |
| 2.09.010  |                         |   | Design development allowance   |
| 2.09.020  |                         |   | Construction contingencies   |
| 2.09.030  |                         |   | Price level adjustments  |
| 2.09.040  |                         |   | Exchange rate fluctuation adjustments  |

| ICMS code | Cost category (level 2) | Cost group (level 3)   | Cost sub-group (level 4)  |
|-----------|-------------------------|--|---|
| 2.10.     | Construction costs      | Taxes and levies   |   |
| 2.10.010  |                         |  | Paid by the Constructor   |
| 2.10.020  |                         |  | Paid by the Client in relation to the construction contract payments  |
| 2.11.     | Construction costs      | Work and utilities off-site  |   |
| 2.11.010  |                         |  | Connections to, diversion of and capacity enhancement of public utility mains or sources off-site up to mains connections on-site   |
| 2.11.020  |                         |  | Public access roads and footpaths   |
| 2.12.     | Construction costs      | Post-completion loose furniture, fittings and equipment                    |   |
| 2.12.010  |                         |  | Production, process, operating and loose furniture, furnishing and equipment not normally provided before completion of construction  |
| 2.13.     | Construction costs      | Construction   Renewal   Maintenance-related consultancies and supervision |   |
| 2.13.010  |                         |  | Consultants' fees and reimbursable  |
| 2.13.020  |                         |  | Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections) |
| 2.13.030  |                         |  | Site supervision charges (including their accommodation and travels)  |
| 2.13.040  |                         |  | Payments to testing authorities or laboratories   |
| 3.        | Renewal cost            |  |   |
| 3.01.     | Renewal cost            | Demolition, site preparation and formation                                 |   |
| 3.01.010  |                         |  | Site survey and ground investigation  |
| 3.01.020  |                         |  | Environmental treatment   |
| 3.01.030  |                         |  | Sampling of hazardous or useful materials or conditions   |
| 3.01.040  |                         |  | Temporary fencing   |
| 3.01.050  |                         |  | Demolition of existing buildings and support to adjacent structures   |
| 3.01.060  |                         |  | Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)  |
| 3.01.070  |                         |  | Tree transplant   |

| ICMS code | Cost category (level 2) | Cost group (level 3)                       | Cost sub-group (level 4)  |
|-----------|-------------------------|--|---|
| 3.01.080  |                         |  | Site formation and slope treatment  |
| 3.01.090  |                         |  | Temporary surface drainage and dewatering   |
| 3.01.100  |                         |  | Temporary protection, diversion and relocation of public utilities  |
| 3.01.110  |                         |  | Erosion control   |
| 3.02.     | Renewal cost            | Substructure                               |   |
| 3.02.010  |                         |  | Foundation piling and underpinning  |
| 3.02.020  |                         |  | Foundations up to top of lowest floor slabs   |
| 3.02.030  |                         |  | Basement sides and bottom   |
| 3.03.     | Renewal cost            | Structure                                  |   |
| 3.03.010  |                         |  | Structural removal and alterations  |
| 3.03.020  |                         |  | Basement suspended floors (up to top of ground floor slabs)   |
| 3.03.030  |                         |  | Frames and slabs (above top of ground floor slabs)  |
| 3.03.040  |                         |  | Tanks, pools, sundries  |
| 3.03.050  |                         |  | Composite or prefabricated work   |
| 3.04.     | Renewal cost            | Architectural works   Non-structural works |   |
| 3.04.010  |                         |  | Non-structural removal and alterations  |
| 3.04.020  |                         |  | External elevations   |
| 3.04.030  |                         |  | Roof finishes, skylights and landscaping (including waterproofing and insulation)   |
| 3.04.040  |                         |  | Internal divisions  |
| 3.04.050  |                         |  | Fittings and sundries   |
| 3.04.060  |                         |  | Finishes under cover  |
| 3.04.070  |                         |  | Builder's work in connection with services  |
| 3.04.080  |                         |  | Composite or prefabricated work   |
| 3.05.     | Renewal cost            | Services and equipment                     |   |
| 3.05.010  |                         |  | Heating, ventilating and air conditioning systems/air conditioners  |
| 3.05.020  |                         |  | Electrical services   |
| 3.05.030  |                         |  | Fitting out lighting fittings   |
| 3.05.040  |                         |  | Extra low voltage services  |
| 3.05.050  |                         |  | Water supply and drainage above ground or inside basement   |
| 3.05.060  |                         |  | Supply of sanitary fittings and fixtures (installation included in 'Water supply and above ground drainage' unless not separable from costs of 'Fittings and sundries') |

| ICMS code | Cost category (level 2) | Cost group (level 3)  | Cost sub-group (level 4)   |
|-----------|-------------------------|---|--|
| 3.05.070  |                         |   | Disposal systems   |
| 3.05.080  |                         |   | Fire services  |
| 3.05.090  |                         |   | Gas services   |
| 3.05.100  |                         |   | Movement systems   |
| 3.05.110  |                         |   | Gondolas   |
| 3.05.120  |                         |   | Turntables   |
| 3.05.130  |                         |   | Generators   |
| 3.05.140  |                         |   | Energy-saving features   |
| 3.05.150  |                         |   | Water and waste water treatment equipment                                  |
| 3.05.160  |                         |   | Fountains, pools and filtration plant                                      |
| 3.05.170  |                         |   | Powered building signage   |
| 3.05.175  |                         |   | Audio/visual entertainment system  |
| 3.05.180  |                         |   | Kitchen equipment  |
| 3.05.190  |                         |   | Cold room equipment  |
| 3.05.200  |                         |   | Laboratory equipment   |
| 3.05.210  |                         |   | Medical equipment  |
| 3.05.220  |                         |   | Hotel equipment  |
| 3.05.230  |                         |   | Car park or entrances access control                                       |
| 3.05.240  |                         |   | Domestic appliances  |
| 3.05.250  |                         |   | Other specialist services  |
| 3.05.260  |                         |   | Builder's profit and attendance on services                                |
| 3.06.     | Renewal cost            | Surface and underground drainage                                    |  |
| 3.06.010  |                         |   | Surface water drainage   |
| 3.06.020  |                         |   | Storm water drainage   |
| 3.06.030  |                         |   | Foul and waste water drainage  |
| 3.06.040  |                         |   | Drainage disconnections and connections                                    |
| 3.06.050  |                         |   | CCTV inspection of existing or new drains                                  |
| 3.06.060  |                         |   | Buried process pipe  |
| 3.07.     | Renewal cost            | External and ancillary works  |  |
| 3.07.010  |                         |   | Permanent retaining structures   |
| 3.07.020  |                         |   | Site enclosures and divisions  |
| 3.07.030  |                         |   | Ancillary structures   |
| 3.07.040  |                         |   | Roads and paving   |
| 3.07.050  |                         |   | Landscaping (hard and soft)  |
| 3.07.060  |                         |   | Fittings and equipment   |
| 3.07.070  |                         |   | External services  |
| 3.08.     | Renewal cost            | Preliminaries   Constructors' site overheads   general requirements |  |
| 3.08.010  |                         |   | Construction management including site management staff and support labour |

| ICMS code | Cost category (level 2) | Cost group (level 3)                                    | Cost sub-group (level 4)   |
|-----------|-------------------------|---|--|
| 3.08.020  |                         |   | Temporary access roads and storage areas, traffic management and diversion (at the Constructors' discretion)                         |
| 3.08.030  |                         |   | Temporary site fencing and securities  |
| 3.08.040  |                         |   | Commonly shared construction plant   |
| 3.08.050  |                         |   | Commonly shared scaffolding  |
| 3.08.060  |                         |   | Other temporary facilities and services  |
| 3.08.070  |                         |   | Technology and communications: telephone, broadband, hardware, software  |
| 3.08.080  |                         |   | Constructor's submissions, reports and as-built documentation  |
| 3.08.090  |                         |   | Quality monitoring, recording and inspections  |
| 3.08.100  |                         |   | Safety, health and environmental management  |
| 3.08.110  |                         |   | Insurances, bonds, guarantees and warranties   |
| 3.08.120  |                         |   | Constructor's statutory fees and charges   |
| 3.08.130  |                         |   | Testing and commissioning  |
| 3.09.     | Renewal cost            | Risk allowances   |  |
| 3.09.010  |                         |   | Design development allowance   |
| 3.09.020  |                         |   | Construction contingencies   |
| 3.09.030  |                         |   | Price level adjustments  |
| 3.09.040  |                         |   | Exchange rate fluctuation adjustments  |
| 3.10.     | Renewal cost            | Taxes and levies  |  |
| 3.10.010  |                         |   | Paid by the Constructor  |
| 3.10.020  |                         |   | Paid by the Client in relation to the construction contract payments   |
| 3.11.     | Renewal cost            | Work and utilities off-site                             |  |
| 3.11.010  |                         |   | Connections to, diversion of and capacity enhancement of public utility mains or sources off-site up to mains connections on-site    |
| 3.11.020  |                         |   | Public access roads and footpaths  |
| 3.12.     | Renewal cost            | Post-completion loose furniture, fittings and equipment |  |
| 3.12.010  |                         |   | Production, process, operating and loose furniture, furnishing and equipment not normally provided before completion of construction |

| ICMS code | Cost category (level 2) | Cost group (level 3)  | Cost sub-group (level 4)  |
|-----------|-------------------------|---|---|
| 3.13.     | Renewal cost            | Construction   Renewal   Maintenance -related consultancies and supervision |   |
| 3.13.010  |                         |   | Consultants' fees and reimbursable  |
| 3.13.020  |                         |   | Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections) |
| 3.13.030  |                         |   | Site supervision charges (including their accommodation and travels)  |
| 3.13.040  |                         |   | Payments to testing authorities or laboratories   |
| 4.        | Operation cost          |   |   |
| 4.01.     | Operation cost          | Cleaning  |   |
| 4.01.010  |                         |   | External cleaning (routine and periodic)  |
| 4.01.020  |                         |   | Internal cleaning (routine and periodic)  |
| 4.01.030  |                         |   | Specialist cleaning (define type)   |
| 4.02      | Operation cost          | Utilities   |   |
| 4.02.010  |                         |   | Fuel (state type: gas/electricity/ oil and other fuel sources)  |
| 4.02.020  |                         |   | Water, drainage and sewerage  |
| 4.03.     | Operation cost          | Waste management  |   |
| 4.03.010  |                         |   | Waste collection and disposal   |
| 4.03.020  |                         |   | Recycling and savage  |
| 4.04.     | Operation cost          | Security  |   |
| 4.04.010  |                         |   | Physical security   |
| 4.04.020  |                         |   | Remote monitoring   |
| 4.05.     | Operation cost          | Information and communications technology                                   |   |
| 4.05.010  |                         |   | Communication systems   |
| 4.05.020  |                         |   | Specialist technology / sensors   |
| 4.06.     | Operation cost          | Operators' site overheads   general requirements                            |   |
| 4.06.010  |                         |   | Administration  |
| 4.06.020  |                         |   | Property insurance  |
| 4.07.     | Operation cost          | Risk allowances   |   |
| 4.07.010  |                         |   | Operation related (user definable)  |
| 4.07.020  |                         |   | Contractual obligations   |

| ICMS code | Cost category (level 2) | Cost group (level 3)                       | Cost sub-group (level 4)   |
|-----------|-------------------------|--|--|
| 4.08.     | Operation cost          | Taxes and levies                           |  |
| 4.08.010  |                         |  | Taxes  |
| 4.08.020  |                         |  | Levies   |
| 5.        | Maintenance cost        |  |  |
| 5.01.     | Maintenance cost        | Demolition, site preparation and formation |  |
| 5.01.010  |                         |  | Site survey and ground investigation   |
| 5.01.020  |                         |  | Environmental treatment  |
| 5.01.030  |                         |  | Sampling of hazardous or useful materials or conditions  |
| 5.01.040  |                         |  | Temporary fencing  |
| 5.01.050  |                         |  | Demolition of existing buildings and support to adjacent structures                                    |
| 5.01.060  |                         |  | Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal) |
| 5.01.070  |                         |  | Tree transplant  |
| 5.01.080  |                         |  | Site formation and slope treatment   |
| 5.01.090  |                         |  | Temporary surface drainage and dewatering  |
| 5.01.100  |                         |  | Temporary protection, diversion and relocation of public utilities                                     |
| 5.01.110  |                         |  | Erosion control  |
| 5.02.     | Maintenance cost        | Substructure                               |  |
| 5.02.010  |                         |  | Foundation piling and underpinning   |
| 5.02.020  |                         |  | Foundations up to top of lowest floor slabs  |
| 5.02.030  |                         |  | Basement sides and bottom  |
| 5.03.     | Maintenance cost        | Structure                                  |  |
| 5.03.010  |                         | Structure                                  | Structural removal and alterations   |
| 5.03.020  |                         | Structure                                  | Basement suspended floors (up to top of ground floor slabs)  |
| 5.03.030  |                         | Structure                                  | Frames and slabs (above top of ground floor slabs)   |
| 5.03.040  |                         | Structure                                  | Tanks, pools, sundries   |
| 5.03.050  |                         | Structure                                  | Composite or prefabricated work  |
| 5.04.     | Maintenance cost        | Architectural works   Non-structural works |  |
| 5.04.010  |                         |  | Non-structural removal and alterations   |
| 5.04.020  |                         |  | External elevations  |
| 5.04.030  |                         |  | Roof finishes, skylights and landscaping (including waterproofing and insulation)                      |
| 5.04.040  |                         |  | Internal divisions   |

| ICMS code | Cost category (level 2) | Cost group (level 3)             | Cost sub-group (level 4)   |
|-----------|-------------------------|----------------------------------|--|
| 5.04.050  |                         |                                  | Fittings and sundries  |
| 5.04.060  |                         |                                  | Finishes under cover   |
| 5.04.070  |                         |                                  | Builder's work in connection with services   |
| 5.04.080  |                         |                                  | Composite or prefabricated work  |
| 5.05.     | Maintenance cost        | Services and equipment           |  |
| 5.05.010  |                         |                                  | Heating, ventilating and air conditioning systems/air conditioners                                   |
| 5.05.020  |                         |                                  | Electrical services  |
| 5.05.030  |                         |                                  | Fitting out lighting fittings  |
| 5.05.040  |                         |                                  | Extra low voltage services   |
| 5.05.050  |                         |                                  | Water supply and drainage above ground or inside basement  |
| 5.05.060  |                         |                                  | Supply of sanitary fittings and fixtures (installation included in                                   |
| 5.05.070  |                         |                                  | 'Water supply and above ground drainage' unless not separable from costs of 'Fittings and sundries') |
| 5.05.080  |                         |                                  | Disposal systems   |
| 5.05.090  |                         |                                  | Fire services  |
| 5.05.100  |                         |                                  | Gas services   |
| 5.05.110  |                         |                                  | Movement systems   |
| 5.05.120  |                         |                                  | Gondolas   |
| 5.05.130  |                         |                                  | Turntables   |
| 5.05.140  |                         |                                  | Generators   |
| 5.05.150  |                         |                                  | Energy-saving features   |
|           |                         |                                  | Water and waste water treatment equipment  |
| 5.05.160  |                         |                                  | Fountains, pools and filtration plant  |
| 5.05.170  |                         |                                  | Powered building signage   |
| 5.05.175  |                         |                                  | Audio/visual entertainment system  |
| 5.05.180  |                         |                                  | Kitchen equipment  |
| 5.05.190  |                         |                                  | Cold room equipment  |
| 5.05.200  |                         |                                  | Laboratory equipment   |
| 5.05.210  |                         |                                  | Medical equipment  |
| 5.05.220  |                         |                                  | Hotel equipment  |
| 5.05.230  |                         |                                  | Car park or entrances access control   |
| 5.05.240  |                         |                                  | Domestic appliances  |
| 5.05.250  |                         |                                  | Other specialist services  |
| 5.05.260  |                         |                                  | Builder's profit and attendance on services  |
| 5.06.     | Maintenance cost        | Surface and underground drainage |  |
| 5.06.010  |                         |                                  | Surface water drainage   |
| 5.06.020  |                         |                                  | Storm water drainage   |
| 5.06.030  |                         |                                  | Foul and waste water drainage  |
| 5.06.040  |                         |                                  | Drainage disconnections and connections  |

| ICMS code | Cost category (level 2) | Cost group (level 3)  | Cost sub-group (level 4)   |
|-----------|-------------------------|---|--|
| 5.06.050  |                         |   | CCTV inspection of existing or new drains  |
| 5.06.060  |                         |   | Buried process pipe  |
| 5.07.     | Maintenance cost        | External and ancillary works  |  |
| 5.07.010  |                         |   | Permanent retaining structures   |
| 5.07.020  |                         |   | Site enclosures and divisions  |
| 5.07.030  |                         |   | Ancillary structures   |
| 5.07.040  |                         |   | Roads and paving   |
| 5.07.050  |                         |   | Landscaping (hard and soft)  |
| 5.07.060  |                         |   | Fittings and equipment   |
| 5.07.070  |                         |   | External services  |
| 5.08.     | Maintenance cost        | Preliminaries   Constructors' site overheads   general requirements |  |
| 5.08.010  |                         |   | Construction management including site management staff and support labour                                   |
| 5.08.020  |                         |   | Temporary access roads and storage areas, traffic management and diversion (at the Constructors' discretion) |
| 5.08.030  |                         |   | Temporary site fencing and securities  |
| 5.08.040  |                         |   | Commonly shared construction plant   |
| 5.08.050  |                         |   | Commonly shared scaffolding  |
| 5.08.060  |                         |   | Other temporary facilities and services  |
| 5.08.070  |                         |   | Technology and communications: telephone, broadband, hardware, software                                      |
| 5.08.080  |                         |   | Constructor's submissions, reports and as-built documentation  |
| 5.08.090  |                         |   | Quality monitoring, recording and inspections  |
| 5.08.100  |                         |   | Safety, health and environmental management  |
| 5.08.110  |                         |   | Insurances, bonds, guarantees and warranties   |
| 5.08.120  |                         |   | Constructor's statutory fees and charges   |
| 5.08.130  |                         |   | Testing and commissioning  |
| 5.09.     | Maintenance cost        | Risk allowances   |  |
| 5.09.010  |                         |   | Design development allowance   |
| 5.09.020  |                         |   | Construction contingencies   |
| 5.09.030  |                         |   | Price level adjustments  |
| 5.09.040  |                         |   | Exchange rate fluctuation adjustments  |
| 5.10.     | Maintenance cost        | Taxes and levies  |  |
| 5.10.010  |                         |   | Paid by the Constructor  |
| 5.10.020  |                         |   | Paid by the Client in relation to the construction contract payments   |

| ICMS code | Cost category (level 2) | Cost group (level 3)   | Cost sub-group (level 4)  |
|-----------|-------------------------|--|---|
| 5.11.     | Maintenance cost        | Work and utilities off-site  |   |
| 5.11.010  |                         | Work and utilities off-site  | Connections to, diversion of and capacity enhancement of public utility mains or sources off-site up to mains connections on-site   |
| 5.11.020  |                         | Work and utilities off-site  | Public access roads and footpaths   |
| 5.12.     | Maintenance cost        | Post-completion loose furniture, fittings and equipment                    |   |
| 5.12.010  |                         |  | Production, process, operating and loose furniture, furnishing and equipment not normally provided before completion of construction  |
| 5.13.     | Maintenance cost        | Construction   Renewal   Maintenance-related consultancies and supervision |   |
| 5.13.010  |                         |  | Consultants' fees and reimbursable  |
| 5.13.020  |                         |  | Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections) |
| 5.13.030  |                         |  | Site supervision charges (including their accommodation and travels)  |
| 5.13.040  |                         |  | Payments to testing authorities or laboratories   |
| 6.        | End of life costs       |  |   |
| 6.01.     | End of life costs       | Disposal inspection  |   |
| 6.01.010  |                         |  | Dilapidations report  |
| 6.01.020  |                         |  | Contractual handback obligations  |
| 6.02.     | End of life costs       | Decommissioning and decontamination  |   |
| 6.02.010  |                         |  | Shutdowns and decommissioning   |
| 6.02.020  |                         |  | Decontamination   |
| 6.03.     | End of life costs       | Decommissioning and decontamination  |   |
| 6.03.010  |                         |  | Demolition  |
| 6.03.020  |                         |  | Reclamation   |
| 6.03.030  |                         |  | Salvage   |

| ICMS code | Cost category (level 2) | Cost group (level 3)                                | Cost sub-group (level 4)              |
|-----------|-------------------------|---|---------------------------------------|
| 6.04.     | End of life costs       | Reinstatement                                       |                                       |
| 6.04.010  |                         |   | Agreed reinstatement works            |
| 6.04.020  |                         |   | Contractual obligations               |
| 6.05.     | End of life costs       | Constructors' site overheads   general requirements |                                       |
| 6.05.010  |                         |   | Administration                        |
| 6.05.020  |                         |   | Overheads (project specific)          |
| 6.06.     | End of life costs       | Risk Allowances                                     |                                       |
| 6.06.010  |                         |   | End of life specific (user definable) |
| 6.06.020  |                         |   | Abnormal risks (user definable)       |
| 6.07.     | End of life costs       | Risk Allowances                                     |                                       |
| 6.07.010  |                         |   | Taxes                                 |
| 6.07.020  |                         |   | Levies                                |
| 6.07.030  |                         |   | Credit for grants                     |



The graphic consists of the word 'Appendix' written vertically in a light blue font to the left of a large, light blue number '3'. A vertical orange line is positioned to the right of the '3'.

## Appendix 3: ICMS and other construction information and cost classification systems

ICMS was designed with the need for compatibility with other established or emerging standards in mind. It has aimed to strike a balance between this need to be compatible and the need for flexibility to accommodate detailed construction information and the different cost classification systems that exist across the world.

The cost sub-groups are generally compatible with the elements in ISO 12006-2:2015: Building construction – Organization of information about construction works – Part 2: Framework for classification and can be adapted to be compatible with most other construction information and cost classification systems. Users of ICMS may adopt a cost sub-group classification based on trades, work breakdown structure or work results according to their local practice.

To promote the adoption and implementation of ICMS, RICS has released ICMS templates in Excel. RICS is also developing maps that show suggested links between regional and local classification systems and ICMS cost groups. SCSI are also developing maps that show the links between National Standard of Building Elements and the OGP civils cost reporting systems and ICMS2. These Excel-based tables show how the detailed classification systems can be mapped to ICMS. The following Excel-based tables will be made available on the ICMS Coalition and SCSI websites:

- National Standard of Building Elements (NSBE)
- OGP CO2 Costing Document (Civil Engineering Works)

Others are also being considered. These tables are provided to demonstrate the process required to connect detailed classification systems with ICMS. As each project is different, the actual mapping will require the intervention of a cost management professional who is familiar with international and local practices as well as the project under consideration. Therefore, these tables are provided as a guide for a skilled practitioner to use.

## Appendix

## 4

## Appendix 4: Survey detail accuracy band table

| Plan accuracy (X,Y) |                       |            | Height accuracy (Z) <sup>1</sup> |                      |                      | Example survey types/uses <sup>2</sup>   | Approximate legacy plot scale output required to achieve accuracy band <sup>3</sup> | Min size of feature shown true to scale (not symbolised) |
|---------------------|-----------------------|------------|----------------------------------|----------------------|----------------------|--|---|--|
| Band                | 1 sigma               | 2 sigma    | Band                             | Accuracy hard detail | Accuracy soft detail |  |   |  |
| A                   | +/- 2mm               | +/- 4mm    | A                                | +/- 2mm              | N/A                  | Monitoring, high accuracy engineering setting out and fabrication surveys  | 1:5   | 4mm  |
| B                   | +/- 4mm               | +/- 8mm    | B                                | +/- 4mm              | N/A                  | Monitoring, high accuracy engineering and measured building surveys and setting out  | 1:10  | 5mm  |
| C                   | +/- 5mm               | +/- 10mm   | C                                | +/- 5mm              | N/A                  | Engineering surveying and setting out, high accuracy measured building surveying, heritage recording   | 1:20  | 10mm   |
| D                   | +/- 10mm              | +/- 20mm   | D                                | +/- 10mm             | +/- 25mm             | Engineering surveying and setting out, measured building surveys, high accuracy topographic surveys, determined boundaries, area registration                              | 1:50  | 20mm   |
| E                   | +/- 25mm              | +/- 50mm   | D                                | +/- 10mm             | +/- 50mm             | Measured building surveys, topographic surveys, low accuracy setting out, net area surveys, valuation surveys, area registration, utility verification (QL-A) PAS 128 (UK) | 1:100   | 50mm   |
| F                   | +/- 50mm              | +/- 100mm  | F                                | +/- 50 mm            | +/- 100mm            | Low accuracy measured building surveys, topographic surveys, high accuracy utility tracing, gross area surveys   | 1:200   | 100mm  |
| G                   | +/- 100mm             | +/- 200mm  | G                                | +/- 50mm             | +/- 100mm            | Topographic surveys, low accuracy measured building surveys, utility tracing surveys, boundary mapping, high accuracy geotechnical, detection (QL-B1) PAS 128 (UK)         | 1:500   | 200mm  |
| H                   | +/- 250mm             | +/- 500mm  | H                                | +/- 125mm            | +/- 250mm            | Low accuracy topographic surveys, national urban area mapping, geotechnical mapping, tree surveys  | 1:1000  | 500mm  |
| I                   | +/- 500mm             | +/- 1000mm | I                                | +/- 500mm            | +/- 1000mm           | Low accuracy topographic mapping, national non-urban mapping, general boundary mapping, asset mapping, utility survey – detection QL-B4 PAS 128 (UK)                       | 1:2500  | 1000mm   |
| J                   | +/- 1000mm            | +/- 2000mm | J                                | +/- 1000mm           | +/- 2000mm           | Low accuracy route/corridor planning surveys, large area GIS asset mapping   | 1:5000  | 2000mm   |
| XY                  | (Custom) <sup>4</sup> |            | Z                                | (Custom)             | (Custom)             | Note: To create a customised band please select the band letter required and add as a prefix to XY or Z (i.e. +/-125mm plan = G-XY)  |   | (Custom)   |

<sup>1</sup>See section 2.3.1 and multiply by 2 for 2 sigma values.

<sup>2</sup>Example survey types/uses – The table includes examples for users of the types of survey and plot scale output that may be suitable for different accuracies. However, this is not an exhaustive list of examples nor fixed to each band.

<sup>3</sup>Legacy plot scale output – This has been included for the benefit of previous users of this document to understand the historical requirements for plot scale related accuracy to achieve this band.

<sup>4</sup>Add more customised rows if required.



Appendix  
**5**

## Appendix 5: Further information

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