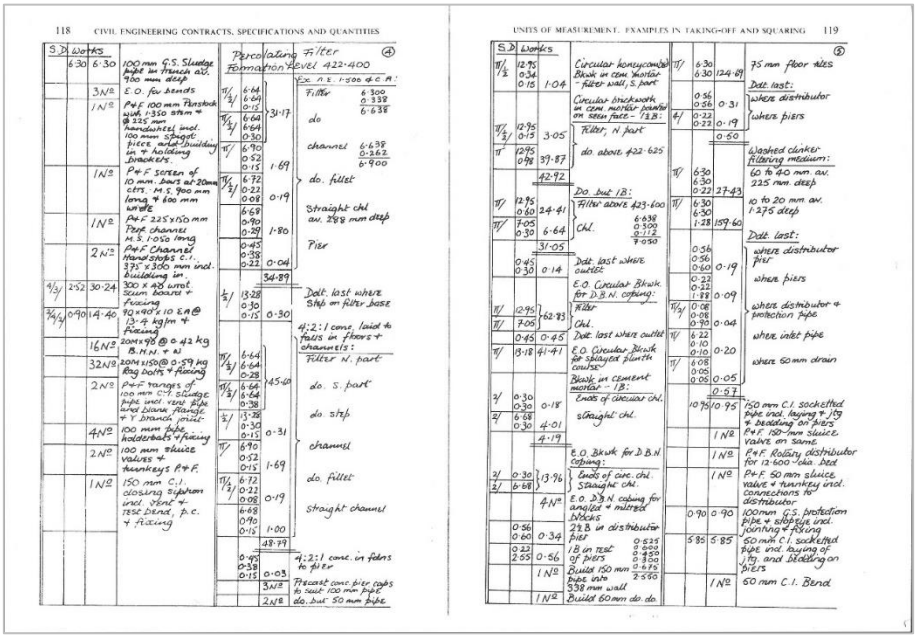
Cost estimate in the UK's cultural environment

Cost management in the cultural environment of the United Kingdom, which includes the Commonwealth and Middle East countries, and to some extent the United States, has a historical origin.

The traditional way of executing the works, of which El Escorial is a good example, was by administration. The materials and wages provided were controlled daily and paid to the different subcontractors or suppliers, without a prior estimate of the works.



Classic example of British-style measurements

The date of the fire and the subsequent reconstruction of London in 1666 is usually indicated when many owners begin to build their houses and they begin to pay for the result of the work done, not for the means used. In this way, independent specialists or "measurers" appear to quantify this work *a posteriori* and pay for it based on prices negotiated with trade contractors. These professionals were mainly experts in mathematics, due to the difficult quantification of stonework and masonry, as also reflected in the similar profession of "geometra" Italy. The first standards for measurements were published in the 17th century, but the cost was only known at the end.

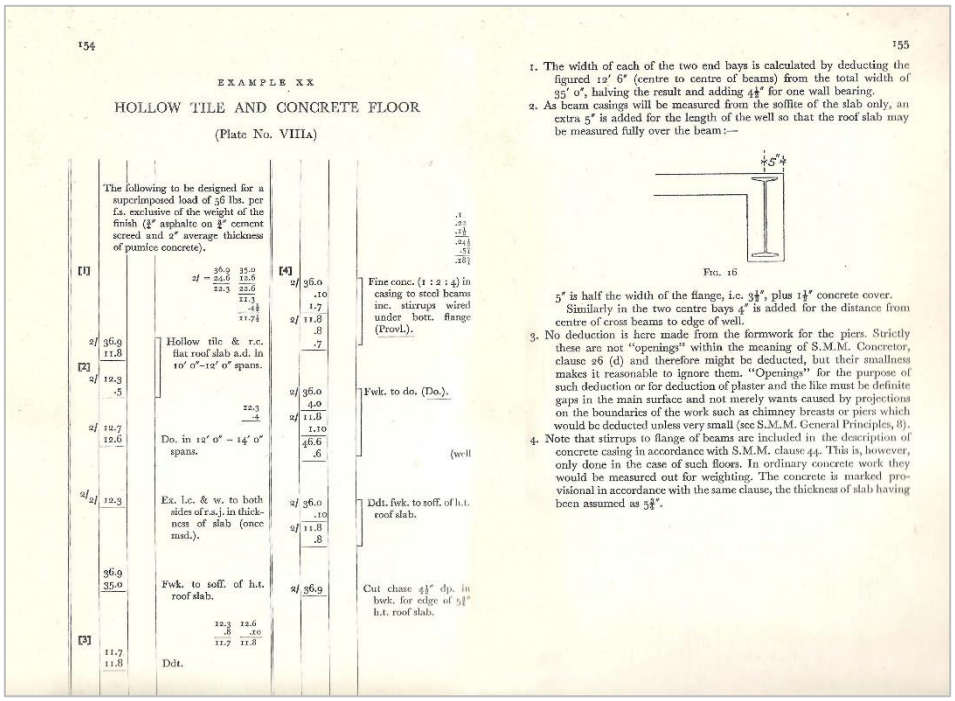
At the beginning of the 19th century the use of the general contractor chosen by bidding price became popular, for which there had to be a detailed project.

The engineers, given the variability of civil works, propose that it be contracted based on a unit price applied to approximate quantities and then the amount actually executed is paid, a method that is still in force, for example, in the contracting of public works in Spain.

The architects used to include as part of their job the final measurement of the work executed and the resolution of disputes with the contractor, but now they also had to

detail the plans much more and prepare measurements that would serve as a basis for the contractors' biddings, avoiding that each one offers on completely different measurements. As a solution, it was adopted to carry out equal measurements for all, the Bill of Quantities BoQ, made by the architect or an independent measurer, and that this job be paid by the winning contractor.

Thus, the Quantity Surveyor QS was born at the beginning of the 20th century as a profession officially in charge of carrying out the BoQ, which is currently grouped in the Royal Institute of Chartered Surveyors, RICS.



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EXAMPLE XX

HOLLOW TILE AND CONCRETE FLOOR

(Plate No. VIIIa)

The following to be designed for a superimposed load of 56 lbs. per s.f. exclusive of the weight of the finish ($\frac{1}{2}$" asphalte on $\frac{1}{2}$" cement screed and 2" average thickness of pumice concrete).

[1] 2/ 36.9 / 11.8 — Hollow tile & r.c. flat roof slab a.d. in 10′ 0″–12′ 0″ spans.

[2] 2/ 12.3 / .5 — 22.3 / .4 — 2/ 12.7 / 12.6 — Do. in 12′ 0″ – 14′ 0″ spans.

2/ 2/ 12.3 — Ex. l.c. & w. to both sides of r.s.j. in thickness of slab (once msd.).

36.9 / 35.0 — Fwk. to soff. of h.t. roof slab.

[3] 11.7 / 11.8 — Ddt.

[4] 2/ 36.0 / .10 / 1.7 / 2/ 11.8 / .8 / .7 — Fine conc. (1 : 2 : 4) in casing to steel beams inc. stirrups wired under bott. flange (Provl.).

2/ 36.0 / 4.0 / 2/ 11.8 / 1.10 / 46.6 / .6 — Fwk. to do. (Do.).

2/ 36.0 / .10 / 2/ 11.8 / .8 — Ddt. fwk. to soff. of h.t. roof slab.

2/ 36.9 — Cut chase $4\frac{1}{2}$" dp. in bwk. for edge of $5\frac{1}{2}$" h.t. roof slab.

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1. The width of each of the two end bays is calculated by deducting the figured 12′ 6″ (centre to centre of beams) from the total width of 35′ 0″, halving the result and adding $4\frac{1}{2}$" for one wall bearing.
2. As beam casings will be measured from the soffite of the slab only, an extra 5" is added for the length of the well so that the roof slab may be measured fully over the beam:—

FIG. 16

5" is half the width of the flange, i.e. $3\frac{1}{2}$", plus $1\frac{1}{2}$" concrete cover. Similarly in the two centre bays 4" is added for the distance from centre of cross beams to edge of well.

3. No deduction is here made from the formwork for the piers. Strictly these are not "openings" within the meaning of S.M.M. Concretor, clause 26 (d) and therefore might be deducted, but their smallness makes it reasonable to ignore them. "Openings" for the purpose of such deduction or for deduction of plaster and the like must be definite gaps in the main surface and not merely wants caused by projections on the boundaries of the work such as chimney breasts or piers which would be deducted unless very small (see S.M.M. General Principles, 8).
4. Note that stirrups to flange of beams are included in the description of concrete casing in accordance with S.M.M. clause 44. This is, however, only done in the case of such floors. In ordinary concrete work they would be measured out for weighting. The concrete is marked provisional in accordance with the same clause, the thickness of slab having been assumed as $5\frac{1}{8}$".

Willis J., Arthur, Elements of Quantity Surveying

In the United States, the independent profession did not develop and construction companies are usually in charge of preparing measurements and prices, resulting in very poorly detailed documents that give them greater control. Perhaps as a result of this situation, the designers are forced to develop in enormous detail the specifications or specifications, which in the European alternative are unnecessary because they are collected in work units descriptions.

> *Martin Brook, Estimating and Tendering for Construction Work, Routledge, Nueva York, 2017*
>
> *The Quantity Surveyor: Missing in Action in the USA, Brian Bowen. Georgia Institute of Technology, Atlanta, USA. Proceedings of the Third International Congress on Construction History, May 2009*

In the Spanish environment and Latin countries the designer assumes the measurements of his own project and in Spain, by law, he also has to prepare the cost estimate, a true anomaly in the world.

It is even considered good practice to use measurement "bags", quantities that do not exist in the project to have hidden counterparts with the contractor.

Fernando Mansilla, Apuntes de mediciones, valoraciones y presupuestos de obras, Sevilla, 1978.

As a result, the measurements are not reliable and construction companies often re-measure the project.

As for setting the prices in the project, a requirement of the works for the administration, thought in origin surely to avoid abuses, it has become a perverse practice. In public works they are high, so that the companies have margin for the lowering the biddings, in private work prices are low so that the owner pays less taxes and, surprisingly, less professional fees.

Unit price analyses or price breakdowns, which are also required for public works in Spain and similar environments, make sense when carried out by a construction company to analyse its costs, but not to figure in the project estimate.

The tradition of British measurements

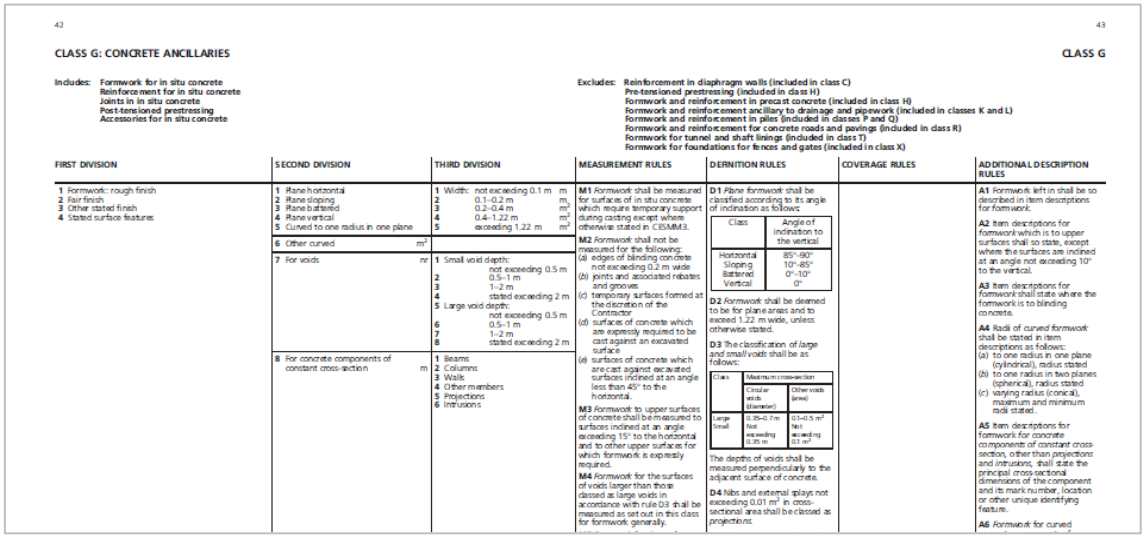
As such a profession, the QS have generated norms and procedures with a certain exclusionary and union character. Thus, together with good construction practices, they introduce many overly detailed and cumbersome criteria, too complicated for today's needs.

The following two examples show how to measure slab and floor edge forms, by length or by area, but with two completely different criteria, depending on the standard chosen.

E20 Formwork for in situ concrete

INFORMATION PROVIDED					MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES	SUPPLEMENTARY INFORMATION
P1 The following information is shown either on location drawings under A Preliminaries/General conditions or on further drawings which accompany the bills of quantities: (a) the relative positions of concrete members (b) the size of members (c) the thickness of slabs (d) the permissible loads in relation to casting times					M1 Except where otherwise stated, formwork is measured to concrete surfaces of the finished structure which require temporary support during casting M2 Curved work is so described with the radii stated	D1 Plain formwork surfaces are those which contain no steps, rebates, pockets or other discontinuities D2 Formwork left in is that which is not designed to remain in position but is nonetheless impossible to remove D3 Permanent formwork is that which is designed to remain in position	C1 Formwork is deemed to include adaptation to accommodate projecting pipes, reinforcing bars and the like C2 Formwork is deemed to include all cutting, splayed edges and the like	S1 Kind and quality of materials and propping requirements for permanent formwork S2 Basic finish where not at the discretion of the Contractor
CLASSIFICATION TABLE								
1 Sides of foundations 2 Sides of ground beams and edges of beds 3 Edges of suspended slabs 4 Sides of upstands 5 Steps in top surfaces 6 Steps in soffits 7 Machine bases and plinths	1 Plain vertical 2 Dimensioned description	1 Height > 1.00 m 2 Height ≤ 250 mm 3 Height 250 – 500 mm 4 Height 500 mm – 1.00 m	m² m	1 Left in 2 Permanent	M3 Passings of ground beams are not deducted from area of formwork	D4 Foundations include bases and pile caps D5 Edges of suspended slabs exclude those associated with attached beams at slab perimeters		

SMM7 Standard Method of Measurement of Building Works, 1922-1998



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CLASS G: CONCRETE ANCILLARIES

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CLASS G

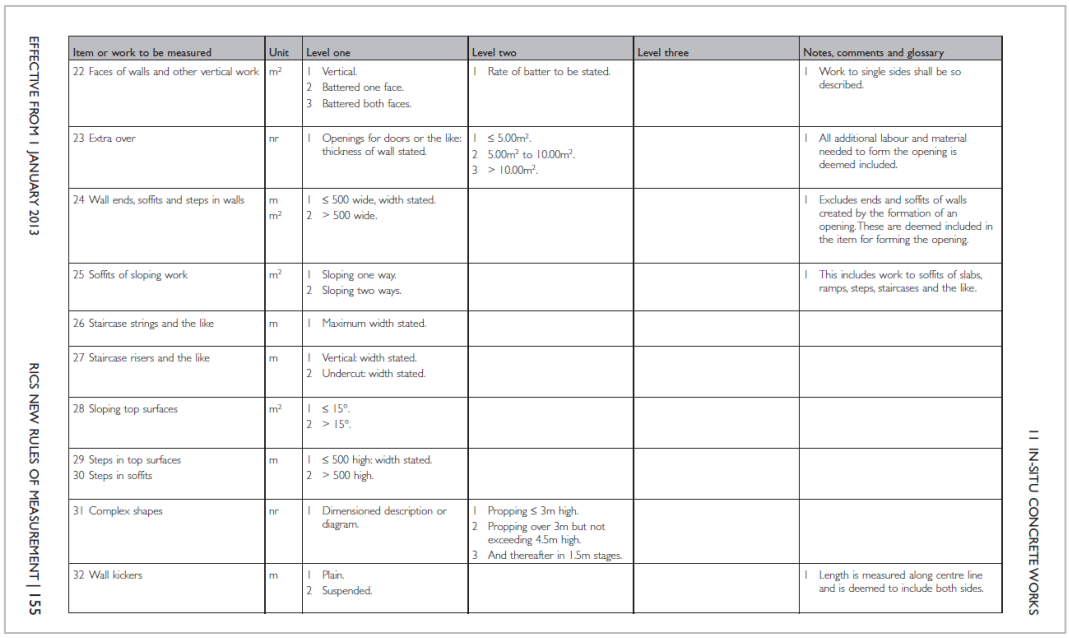
Includes: Formwork for in situ concrete
Reinforcement for in situ concrete
Joints in in situ concrete
Post-tensioned prestressing
Accessories for in situ concrete

Excludes: Reinforcement in diaphragm walls (included in class C)
Pre-tensioned prestressing (included in class H)
Formwork and reinforcement in precast concrete (included in class H)
Formwork and reinforcement ancillary to drainage and pipework (included in classes K and L)
Formwork and reinforcement in piles (included in classes P and Q)
Formwork and reinforcement for concrete roads and pavings (included in class R)
Formwork for tunnel and shaft linings (included in class T)
Formwork for foundations for fences and gates (included in class X)

FIRST DIVISION	SECOND DIVISION	THIRD DIVISION	MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES	ADDITIONAL DESCRIPTION RULES
1 Formwork: rough finish 2 Fair finish 3 Other stated finish 4 Stated surface features	1 Plane horizontal 2 Plane sloping 3 Plane battered 4 Plane vertical 5 Curved to one radius in one plane 6 Other curved m² 7 For voids nr 8 For concrete components of constant cross-section m	1 Width: not exceeding 0.1 m m 2 0.1–0.2 m m, 3 0.2–0.4 m m² 4 0.4–1.22 m m² 5 exceeding 1.22 m m² 1 Small void depth: not exceeding 0.5 m 2 0.5–1 m 3 1–2 m 4 stated exceeding 2 m 5 Large void depth: not exceeding 0.5 m 6 0.5–1 m 7 1–2 m 8 stated exceeding 2 m 1 Beams 2 Columns 3 Walls 4 Other members 5 Projections 6 Intrusions	**M1** *Formwork* shall be measured for surfaces of in situ concrete which require temporary support during casting except where otherwise stated in CESMM3. **M2** *Formwork* shall not be measured for the following: (a) edges of blinding concrete not exceeding 0.2 m wide (b) joints and associated rebates and grooves (c) temporary surfaces formed at the discretion of the Contractor (d) surfaces of concrete which are expressly required to be cast against an excavated surface (e) surfaces of concrete which are cast against excavated surfaces inclined at an angle less than 45° to the horizontal. **M3** *Formwork* to upper surfaces of concrete shall be measured to surfaces inclined at an angle exceeding 15° to the horizontal and to other upper surfaces for which formwork is expressly required. **M4** *Formwork* for the surfaces of voids larger than those classed as large voids in accordance with rule D3 shall be measured as set out in this class for formwork generally.	**D1** *Plane formwork* shall be classified according to its angle of inclination as follows Class: Horizontal; Sloping; Battered; Vertical — Angle of inclination to the vertical: 85°–90°; 10°–85°; 0°–10°; 0° **D2** *Formwork* shall be deemed to be for plane areas and to exceed 1.22 m wide, unless otherwise stated. **D3** The classification of *large* and *small voids* shall be as follows: Class: Large; Small — Maximum cross-section: Circular voids (diameter): Not exceeding 0.25 m; Other voids (area): Not exceeding 0.1 m² / 0.1–0.5 m² The depths of voids shall be measured perpendicularly to the adjacent surface of concrete. **D4** Nibs and external splays not exceeding 0.01 m² in cross-sectional area shall be classed as *projections*.		**A1** Formwork left in shall be so described in item descriptions for *formwork*. **A2** Item descriptions for *formwork* which is to upper surfaces shall so state, except where the surfaces are inclined at an angle not exceeding 10° to the vertical. **A3** Item descriptions for *formwork* shall state where the formwork is to blinding concrete. **A4** Radii of *curved formwork* shall be stated in item descriptions as follows: (a) to one radius in one plane (cylindrical), radius stated (b) to one radius in two planes (spherical), radius stated (c) varying radius (conical), maximum and minimum radii stated. **A5** Item descriptions for *formwork for concrete components of constant cross-section, other than projections and intrusions*, shall state the principal cross-sectional dimensions of the component and its mark number, location or other unique identifying feature. **A6** *Formwork* for curved

ICE CESMM Civil Engineering Standard Method of Measurement 2012

SMM7 was replaced as of 2013 by New Rules of Measurement, NRM, promoted by RICS, much simpler, but many projects are still required to be measured based on SMM7 by inertia.



EFFECTIVE FROM 1 JANUARY 2013

Item or work to be measured	Unit	Level one	Level two	Level three	Notes, comments and glossary
22 Faces of walls and other vertical work	m²	1 Vertical. 2 Battered one face. 3 Battered both faces.	1 Rate of batter to be stated.		1 Work to single sides shall be so described.
23 Extra over	nr	1 Openings for doors or the like; thickness of wall stated.	1 ≤ 5.00m². 2 5.00m² to 10.00m². 3 > 10.00m².		1 All additional labour and material needed to form the opening is deemed included.
24 Wall ends, soffits and steps in walls	m m²	1 ≤ 500 wide, width stated. 2 > 500 wide.			1 Excludes ends and soffits of walls created by the formation of an opening. These are deemed included in the item for forming the opening.
25 Soffits of sloping work	m²	1 Sloping one way. 2 Sloping two ways.			1 This includes work to soffits of slabs, ramps, steps, staircases and the like.
26 Staircase strings and the like	m	1 Maximum width stated.			
27 Staircase risers and the like	m	1 Vertical: width stated. 2 Undercut: width stated.			
28 Sloping top surfaces	m²	1 ≤ 15°. 2 > 15°.			
29 Steps in top surfaces 30 Steps in soffits	m	1 ≤ 500 high: width stated. 2 > 500 high.			
31 Complex shapes	nr	1 Dimensioned description or diagram.	1 Propping ≤ 3m high. 2 Propping over 3m but not exceeding 4.5m high. 3 And thereafter in 1.5m stages.		
32 Wall kickers	m	1 Plain. 2 Suspended.			1 Length is measured along centre line and is deemed to include both sides.

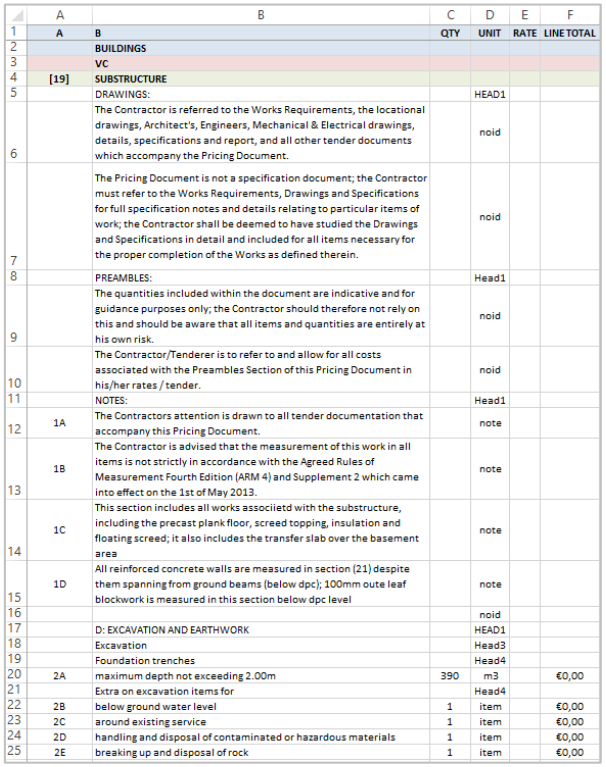
RICS NEW RULES OF MEASUREMENT | 155

11 IN-SITU CONCRETE WORKS

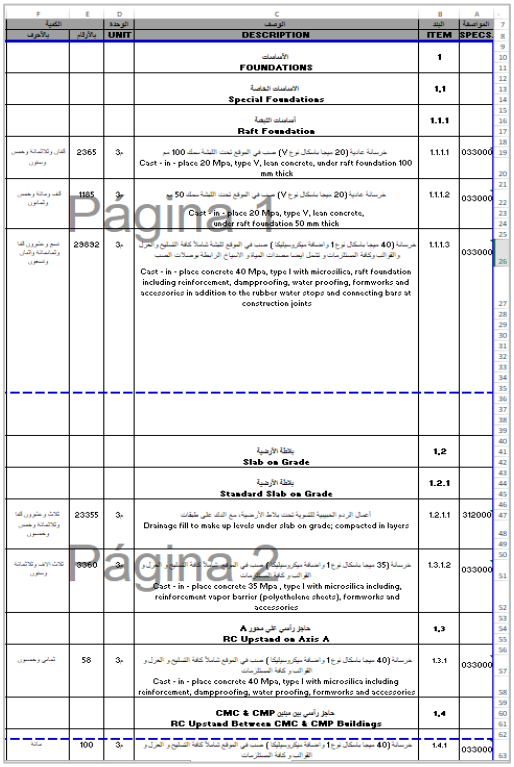
New Rules of Measurement volume 2, NRM2

Pricing

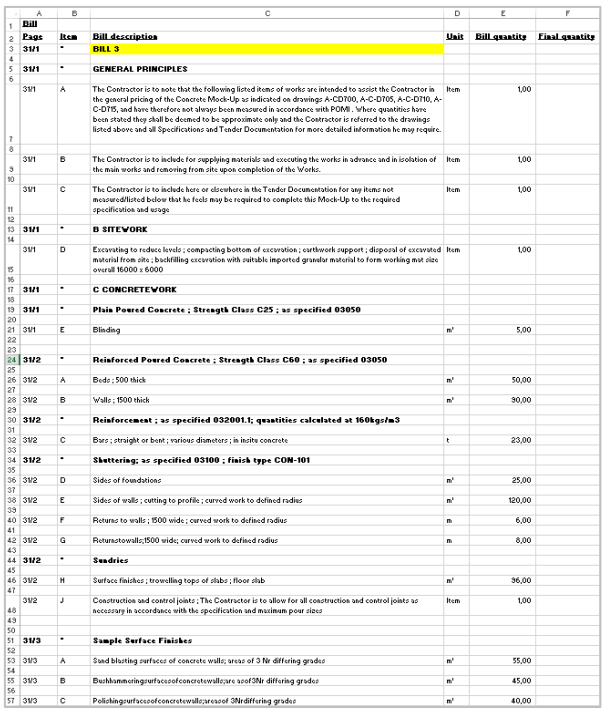
In the environment in which we focus, it is always the contractors or, in any case, entities independent of the designers, who set the price for the work units, "work packages" or "line items".



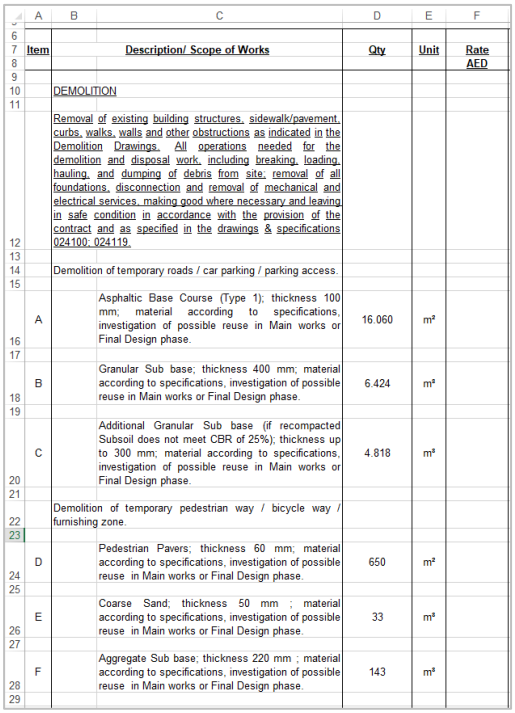
	A	B	C	D	E	F
1	A	B	QTY	UNIT	RATE	LINE TOTAL
2		BUILDINGS				
3		VC				
4	[19]	SUBSTRUCTURE				
5		DRAWINGS:		HEAD1		
6		The Contractor is referred to the Works Requirements, the locational drawings, Architect's, Engineers, Mechanical & Electrical drawings, details, specifications and report, and all other tender documents which accompany the Pricing Document.		noid		
7		The Pricing Document is not a specification document; the Contractor must refer to the Works Requirements, Drawings and Specifications for full specification notes and details relating to particular items of work; the Contractor shall be deemed to have studied the Drawings and Specifications in detail and included for all items necessary for the proper completion of the Works as defined therein.		noid		
8		PREAMBLES:		Head1		
9		The quantities included within the document are indicative and for guidance purposes only; the Contractor should therefore not rely on this and should be aware that all items and quantities are entirely at his own risk.		noid		
10		The Contractor/Tenderer is to refer to and allow for all costs associated with the Preambles Section of this Pricing Document in his/her rates / tender.		noid		
11		NOTES:		Head1		
12	1A	The Contractors attention is drawn to all tender documentation that accompany this Pricing Document.		note		
13	1B	The Contractor is advised that the measurement of this work in all items is not strictly in accordance with the Agreed Rules of Measurement Fourth Edition (ARM 4) and Supplement 2 which came into effect on the 1st of May 2013.		note		
14	1C	This section includes all works assosciietd with the substructure, including the precast plank floor, screed topping, insulation and floating screed; it also includes the transfer slab over the basement area		note		
15	1D	All reinforced concrete walls are measured in section (21) despite them spanning from ground beams (below dpc); 100mm oute leaf blockwork is measured in this section below dpc level		note		
16				noid		
17		D: EXCAVATION AND EARTHWORK		HEAD1		
18		Excavation		Head3		
19		Foundation trenches		Head4		
20	2A	maximum depth not exceeding 2.00m	390	m3		€0,00
21		Extra on excavation items for		Head4		
22	2B	below ground water level	1	item		€0,00
23	2C	around existing service	1	item		€0,00
24	2D	handling and disposal of contaminated or hazardous materials	1	item		€0,00
25	2E	breaking up and disposal of rock	1	item		€0,00



F	E	D	C	B	A
الكمية بالأحرف	الكمية بالأرقام	الوحدة UNIT	الوصف DESCRIPTION	البند ITEM	المواصفة SPECS
			الأساسات FOUNDATIONS	1	
			الاساسات الخاصة Special Foundations	1,1	
			أساسات اللبخة Raft Foundation	1.1.1	
ألفان وثلاثمائة وخمس وستون	2365	م٣	خرسانة عادية (20 ميجا باسكال نوع V) مصب في الموقع تحت اللبخة بسمك 100 مم Cast - in - place 20 Mpa, type V, lean concrete, under raft foundation 100 mm thick	1.1.1.1	033000
ألف ومائة وخمس وثمانون	1185	م٣	خرسانة عادية (20 ميجا باسكال نوع V) مصب في الموقع تحت اللبخة بسمك 50 مم Cast - in - place 20 Mpa, type V, lean concrete, under raft foundation 50 mm thick	1.1.1.2	033000
تسع وعشرون ألفا وثمانمائة واثنان وستون	29832	م٣	خرسانة (40 ميجا باسكال نوع I واضافة ميكروسيليكا) مصب في الموقع للبخة شاملاً كافة التسليح والعزل والقوالب وكافة المستلزمات و تشمل ايضا معدات الحماية والانسياح الرابطة بوصلات الصب Cast - in - place concrete 40 Mpa, type I with microsilica, raft foundation including reinforcement, dampproofing, water proofing, formworks and accessories in addition to the rubber water stops and connecting bars at construction joints	1.1.1.3	033000
			بلاطة الأرضية Slab on Grade	1,2	
			بلاطة الأرضية Standard Slab on Grade	1.2.1	
ثلاث وعشرون ألفا وثلاثمائة وخمس وخمسون	23355	م٣	أعمال الردم الحصوية للتسوية تحت بلاطة الأرضية، مع الدك على طبقات Drainage fill to make up levels under slab on grade; compacted in layers	1.2.1.1	312000
ثلاث الاف وثلاثمائة وستون	3360	م٣	خرسانة (35 ميجا باسكال نوع I واضافة ميكروسيليكا) مصب في الموقع شاملاً كافة التسليح والعزل و القوالب وكافة المستلزمات Cast - in - place concrete 35 Mpa, type I with microsilica including, reinforcement vapor barrier (polyethylene sheets), formworks and accessories	1.3.1.2	033000
			حائط رأسي على محور A RC Upstad on Axis A	1,3	
ثماني وخمسون	58	م٣	خرسانة (40 ميجا باسكال نوع I واضافة ميكروسيليكا) مصب في الموقع شاملاً كافة التسليح والعزل و القوالب وكافة المستلزمات Cast - in - place concrete 40 Mpa, type I with microsilica including reinforcement, dampproofing, water proofing, formworks and accessories	1.3.1	033000
			حائط رأسي بين مبنى CMC & CMP RC Upstad Between CMC & CMP Buildings	1,4	
مائة	100	م٣	خرسانة (40 ميجا باسكال نوع I واضافة ميكروسيليكا) مصب في الموقع شاملاً كافة التسليح والعزل و القوالب وكافة المستلزمات	1.4.1	033000



	A	B	C	D	E	F
1	Bill					
2	Page	Item	Bill description	Unit	Bill quantity	Final quantity
3	31/1	*	BILL 3			
4						
5	31/1	*	GENERAL PRINCIPLES			
6						
7	31/1	A	The Contractor is to note that the following listed items of works are intended to assist the Contractor in the general pricing of the Concrete Mock-Up as indicated on drawings A-CD700, A-C-D705, A-C-D710, A-C-D715, and have therefore not always been measured in accordance with POMI. Where quantities have been stated they shall be deemed to be approximate only and the Contractor is referred to the drawings listed above and all Specifications and Tender Documentation for more detailed information he may require.	Item	1,00	
8						
9	31/1	B	The Contractor is to include for supplying materials and executing the works in advance and in isolation of the main works and removing from site upon completion of the Works.	Item	1,00	
10						
11	31/1	C	The Contractor is to include here or elsewhere in the Tender Documentation for any items not measured/listed below that he feels may be required to complete this Mock-Up to the required specification and usage	Item	1,00	
12						
13	31/1	*	B SITEWORK			
14						
15	31/1	D	Excavating to reduce levels ; compacting bottom of excavation ; earthwork support ; disposal of excavated material from site ; backfilling excavation with suitable imported granular material to form working mat size overall 16000 x 6000	Item	1,00	
16						
17	31/1	*	C CONCRETEWORK			
18						
19	31/1	*	Plain Poured Concrete ; Strength Class C25 ; as specified 03050			
20						
21	31/1	E	Blinding	m²	5,00	
22						
23						
24	31/2	*	Reinforced Poured Concrete ; Strength Class C60 ; as specified 03050			
25						
26	31/2	A	Beds ; 500 thick	m²	50,00	
27						
28	31/2	B	Walls ; 1500 thick	m²	90,00	
29						
30	31/2	*	Reinforcement ; as specified 032001.1; quantities calculated at 160kgs/m3			
31						
32	31/2	C	Bars ; straight or bent ; various diameters ; in insitu concrete	t	23,00	
33						
34	31/2	*	Shuttering; as specified 03100 ; finish type CON-101			
35						
36	31/2	D	Sides of foundations	m²	25,00	
37						
38	31/2	E	Sides of walls ; cutting to profile ; curved work to defined radius	m²	120,00	
39						
40	31/2	F	Returns to walls ; 1500 wide ; curved work to defined radius	m	6,00	
41						
42	31/2	G	Returnstowalls;1500 wide; curved work to defined radius	m	8,00	
43						
44	31/2	*	Sundries			
45						
46	31/2	H	Surface finishes ; trowelling tops of slabs ; floor slab	m²	36,00	
47						
48	31/2	J	Construction and control joints ; The Contractor is to allow for all construction and control joints as necessary in accordance with the specification and maximum pour sizes	Item	1,00	
49						
50						
51	31/3	*	Sample Surface Finishes			
52						
53	31/3	A	Sand blasting surfaces of concrete walls; areas of 3 Nr differing grades	m²	55,00	
54						
55	31/3	B	Bushhammeringsurfacesofconcretewalls;are asof3Nr differing grades	m²	45,00	
56						
57	31/3	C	Polishingsurfacesofconcretewalls;areasof 3Nrdiffering grades	m²	40,00	



	A	B	C	D	E	F
6						
7	Item		Description/ Scope of Works	Qty	Unit	Rate AED
8						
9						
10			DEMOLITION			
11						
12			Removal of existing building structures, sidewalk/pavement, curbs, walks, walls and other obstructions as indicated in the Demolition Drawings. All operations needed for the demolition and disposal work, including breaking, loading, hauling, and dumping of debris from site, removal of all foundations, disconnection and removal of mechanical and electrical services, making good where necessary and leaving in safe condition in accordance with the provision of the contract and as specified in the drawings & specifications 024100- 024119.			
13						
14			Demolition of temporary roads / car parking / parking access.			
15						
16	A		Asphaltic Base Course (Type 1); thickness 100 mm; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	16.060	m²	
17						
18	B		Granular Sub base; thickness 400 mm; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	6.424	m³	
19						
20	C		Additional Granular Sub base (if recompacted Subsoil does not meet CBR of 25%); thickness up to 300 mm; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	4.818	m³	
21						
22			Demolition of temporary pedestrian way / bicycle way / furnishing zone.			
23						
24	D		Pedestrian Pavers; thickness 60 mm; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	650	m²	
25						
26	E		Coarse Sand; thickness 50 mm ; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	33	m³	
27						
28	F		Aggregate Sub base; thickness 220 mm ; material according to specifications, investigation of possible reuse in Main works or Final Design phase.	143	m³	
29						

BoQs for tender, delivered in Excel

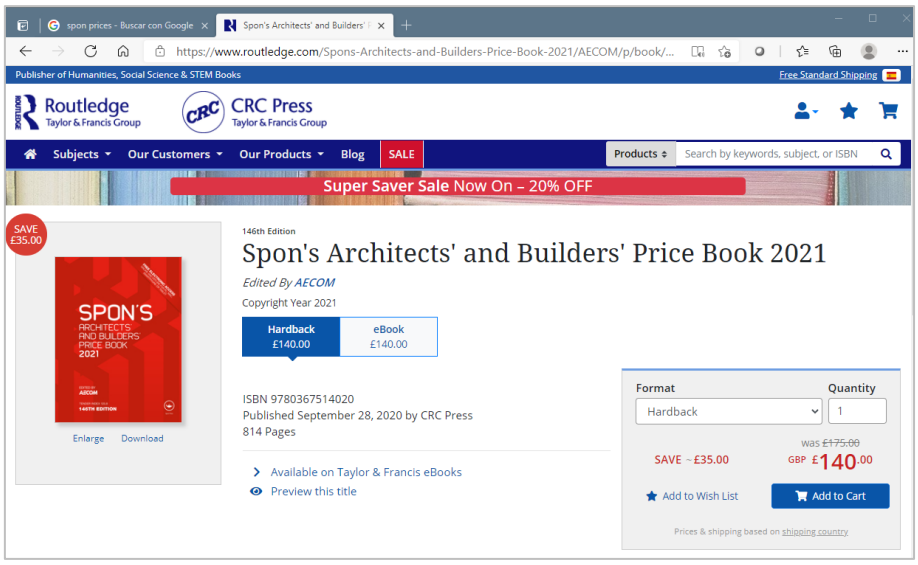
In the absence of an exchange format such as BC3, the one used in Spain, these measurements are delivered to potential bidders in non-usable digital PDF documents or in Excel sheets without a predefined structure.

Price allocation

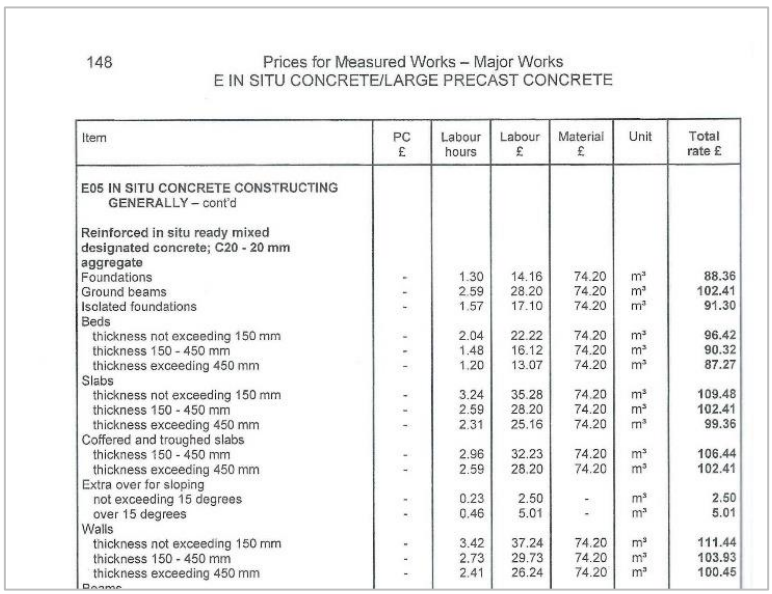
As already mentioned, the allocation of prices corresponds to professionals and companies that are much more specialized than the usual ones in our environment. Therefore, there is not so much need for publicly accessible price databases, rather each company has its own procedures to obtain them.

Accessible tools are few, expensive and not digitally interoperable. Generally, they do not contain unit price analysis or breakdowns, but rather a generic breakdown, for example, labour, machinery, and materials.

SPON is available in the UK, exclusively on paper or in eBook format, which only allows manual consultation and use. Each title, like the one presented in the image, refers to a specialty, such as facilities, civil works, urbanization, etc.



SPON price table for architects and builders for thick work



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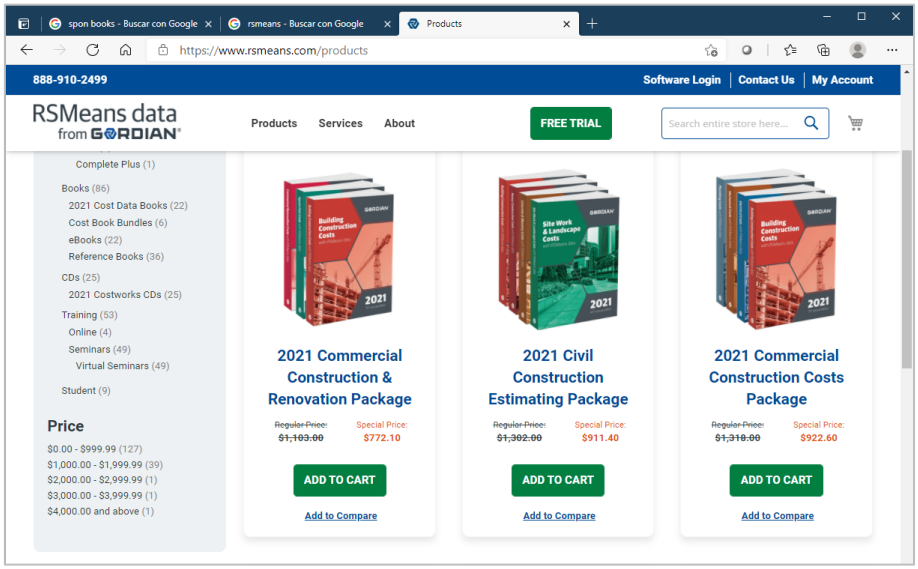
Prices for Measured Works – Major Works
E IN SITU CONCRETE/LARGE PRECAST CONCRETE

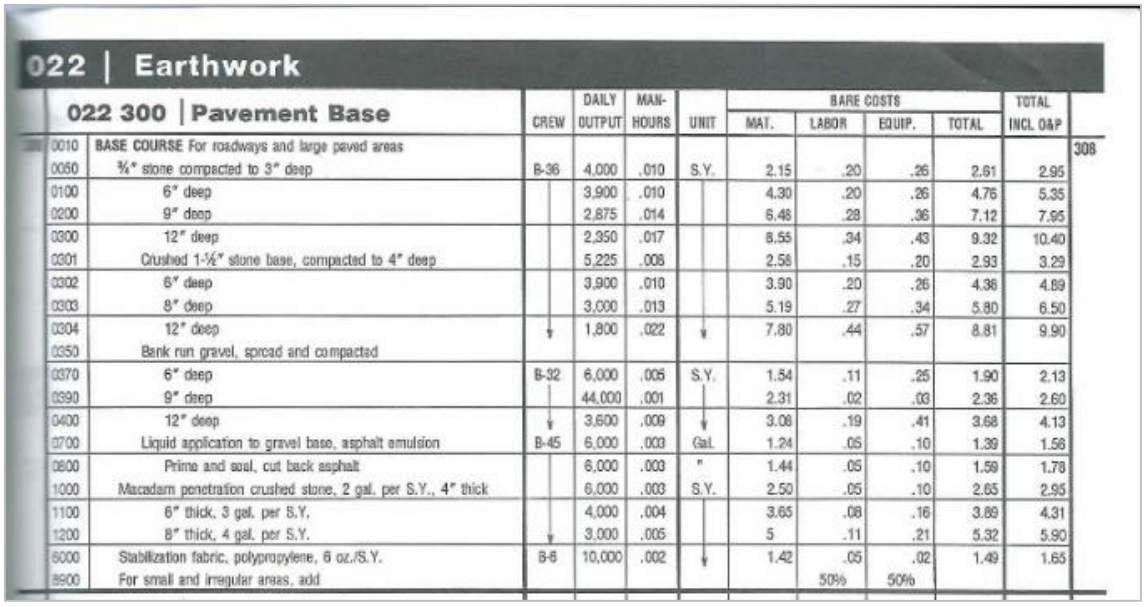
Item	PC £	Labour hours	Labour £	Material £	Unit	Total rate £
E05 IN SITU CONCRETE CONSTRUCTING GENERALLY – cont'd						
Reinforced in situ ready mixed designated concrete; C20 - 20 mm aggregate						
Foundations	-	1.30	14.16	74.20	m³	88.36
Ground beams	-	2.59	28.20	74.20	m³	102.41
Isolated foundations	-	1.57	17.10	74.20	m³	91.30
Beds						
thickness not exceeding 150 mm	-	2.04	22.22	74.20	m³	96.42
thickness 150 - 450 mm	-	1.48	16.12	74.20	m³	90.32
thickness exceeding 450 mm	-	1.20	13.07	74.20	m³	87.27
Slabs						
thickness not exceeding 150 mm	-	3.24	35.28	74.20	m³	109.48
thickness 150 - 450 mm	-	2.59	28.20	74.20	m³	102.41
thickness exceeding 450 mm	-	2.31	25.16	74.20	m³	99.36
Coffered and troughed slabs						
thickness 150 - 450 mm	-	2.96	32.23	74.20	m³	106.44
thickness exceeding 450 mm	-	2.59	28.20	74.20	m³	102.41
Extra over for sloping						
not exceeding 15 degrees	-	0.23	2.50	-	m³	2.50
over 15 degrees	-	0.46	5.01	-	m³	5.01
Walls						
thickness not exceeding 150 mm	-	3.42	37.24	74.20	m³	111.44
thickness 150 - 450 mm	-	2.73	29.73	74.20	m³	103.93
thickness exceeding 450 mm	-	2.41	26.24	74.20	m³	100.45
Beams						

SPON Prices for concrete elements

The RSMeans pricing table is available in the United States and, as mentioned, there is more need and availability for specification generation systems, such as BSD Speclink.



https://www.rsmeans.com/products



022 | Earthwork

022 300 | Pavement Base

		CREW	DAILY OUTPUT	MAN-HOURS	UNIT	BARE COSTS MAT.	BARE COSTS LABOR	BARE COSTS EQUIP.	BARE COSTS TOTAL	TOTAL INCL O&P	
0010	**BASE COURSE** For roadways and large paved areas										308
0050	¾" stone compacted to 3" deep	B-36	4,000	.010	S.Y.	2.15	.20	.26	2.61	2.95	
0100	6" deep		3,900	.010		4.30	.20	.26	4.76	5.35	
0200	9" deep		2,875	.014		6.48	.28	.36	7.12	7.95	
0300	12" deep		2,350	.017		8.55	.34	.43	9.32	10.40	
0301	Crushed 1-½" stone base, compacted to 4" deep		5,225	.006		2.58	.15	.20	2.93	3.29	
0302	6" deep		3,900	.010		3.90	.20	.26	4.36	4.89	
0303	8" deep		3,000	.013		5.19	.27	.34	5.80	6.50	
0304	12" deep		1,800	.022		7.80	.44	.57	8.81	9.90	
0350	Bank run gravel, spread and compacted										
0370	6" deep	B-32	6,000	.005	S.Y.	1.54	.11	.25	1.90	2.13	
0390	9" deep		44,000	.001		2.31	.02	.03	2.36	2.60	
0400	12" deep		3,600	.009		3.08	.19	.41	3.68	4.13	
0700	Liquid application to gravel base, asphalt emulsion	B-45	6,000	.003	Gal.	1.24	.05	.10	1.39	1.56	
0800	Prime and seal, cut back asphalt		6,000	.003	"	1.44	.05	.10	1.59	1.78	
1000	Macadam penetration crushed stone, 2 gal. per S.Y., 4" thick		6,000	.003	S.Y.	2.50	.05	.10	2.65	2.95	
1100	6" thick, 3 gal. per S.Y.		4,000	.004		3.65	.08	.16	3.89	4.31	
1200	8" thick, 4 gal. per S.Y.		3,000	.005		5	.11	.21	5.32	5.90	
6000	Stabilization fabric, polypropylene, 6 oz./S.Y.	B-6	10,000	.002		1.42	.05	.02	1.49	1.65	
8900	For small and irregular areas, add						50%	50%			

R.S. Means Earthmoving Prices

An analysis with Presto of a price taken from this table can be seen below.

An international price table in English is supplied with Presto, which breaks down the prices into their specific components of labour and machinery, plus a generic concept of materials.

		Código	NatC	Resumen	CanPres	Ud	Pres	ImpPres
1/0	–	10000000		AllCostData	1		0	0
2/1	+ 1	14000000		Quality Control	1		0	0
3/1	+ 2	15000000		Construction Facilities & Temporary Controls	1		0	0
4/1	+ 3	15500000		Labor/Wage Rates	1		0	0
5/1	+ 4	16000000		Material And Equipment	1		0	0
6/1	+ 5	17000000		Contract Closeout	1		0	0
7/1	+ 6	18000000		General Maintenance	1		0	0
8/1	+ 7	19000000		Professional Services	1		0	0
9/1	+ 8	20000000		Site Work	1		0	0
10/1	+ 9	30000000		Concrete	1		0	0
11/1	+ 10	40000000		Masonry	1		0	0
12/1	+ 11	50000000		Metals	1		0	0
13/1	+ 12	60000000		Wood & Plastics	1		0	0
14/1	+ 13	70000000		Thermal & Moisture Protection	1		0	0
15/1	+ 14	80000000		Doors & Windows	1		0	0
16/1	+ 15	90000000		Finishes	1		0	0
17/1	+ 16	100000000		Specialties	1		0	0
18/1	+ 17	110000000		Equipment	1		0	0
19/1	+ 18	120000000		Furnishings	1		0	0
20/1	+ 19	130000000		Special Construction	1		0	0
21/1	+ 20	140000000		Conveying Systems	1		0	0
22/1	+ 21	150000000		Mechanical	1		0	0
23/1	+ 22	160000000		Electrical	1		0	0

Chapters of the international price table AllCostData

Código	NatC	Resumen	CanPres	Ud	Pres	ImpPres
33990100		Roller compacted concrete, spread & compact, 1' lift, 1' layer		m3	1,51	
R50Z5760		ROLLER, VIB, SD, TOWED 2 TON, 55" WIDE X 40" DIA	0,008	HR	7,84	0,06
T10Z6280		BLADE, ANGLE, HYDRAULIC (FOR 181 - 250 HP DOZER)	0,008	HR	9,49	0,08
T15Z6520		DOZER, CRAWLER, 181-250 HP, PS LGP (ADD BLADE)	0,008	HR	114,30	0,91
B-EQOPRMED		Equip. Operators, Medium	0,008	HR	40,99	0,33
B-LABORER		Laborers, (Semi-Skilled)	0,004	HR	32,25	0,13

Unit Price Analysis of AllCostData International Price Chart

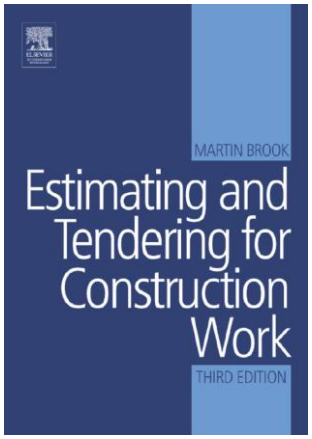
Cost estimation

The calculation of prices or estimated costs is carried out with two approaches, as is the case in the rest of the world.

- Prices based on a breakdown or standard, which allow obtaining the estimated unit cost in relatively independent conditions of a specific work and its surroundings. These prices are multiplied by the desired quantity and added with other similar ones to obtain the total amount.
- Prices are calculated taking into account from the origin the total quantities and means needed for a specific situation, called operational prices or first principles pricing.

Project professionals use the first system, which generally come from historical price and value tables, and construction companies use a combination of the second, for the most important components of the work, and the first, for all the others.

Martin Brook, Estimating and Tendering for Construction Work, Elsevier, 2017



This text proposes some representative examples of each case.

Unit price analysis

typical bill description

11 In situ concrete

Reinforced in situ concrete; mix B, 20mm aggregate; horizontal work; ≤ 300 thick in structures
..369m³

item details					analysis				net
ref:	description	quant	unit	rate	lab	plt	mat	s/c	unit rate
	From an inspection of the drawings, it can be								
	seen that 20% of the concrete is in 200mm beds								
	and 80% in upper floor slabs 275mm thick								
	Hourly rate for concrete gang:								
	Working ganger	1	hr	14.00	14.00				
	Labourers (4nr)	4	hr	13.00	52.00				
	Carpenter in attendance	1	hr	18.00	18.00				
	* Poker vibrator (2nr)	2	hr	3.00		6.00			
	* Concrete pump	1	hr	54.00		54.00			
	Rate for concrete gang	1	hr		84.00	60.00			144.00
	Effective rate for one operative (÷5)	1	hr		16.80	12.00			28.80
Mat	Concrete price from supplier	1	m³	90.00			90.00		
	Waste for concrete in beds (0.075*20%)	0.015	m³	90.00			1.35		
	Waste for concrete in slabs (0.05*80%)	0.04	m³	90.00			3.60		
Lab	Concrete operative for ground beds (1.25hr*20%)	0.25	hr	16.80	4.20				
Plt	* Vibrator and pump ditto	0.25	hr	12.00		3.00			
Lab	Concrete operative for floor slabs (2.25hr*80%)	1.80	hr	16.80	30.24				
Plt	* Vibrator and pump ditto	1.80	hr	12.00		21.60			
	Rate for in situ concrete	1	m³		34.44	24.60	94.95		153.99

Calculation as unit price

It is an average unit price, which is valid for both concrete beds and slabs. First, the price of the concrete equipment is studied, which includes the operators, the vibrator and the pump. This price is divided by the base or reference production of 5 m3.

The amount of concrete is increased by prorated loss percentages that are different for the beds and slabs and the cost of the newly calculated equipment is added in the same way, correcting the base production for factors that are also different.

The habit of using operational prices makes this price is not a pure unit price, since the proportion of beds and slabs must be calculated in advance and the price obtained is only valid for that exact proportion

In Presto a specific auxiliary price is created.

	Código	NatC	Ie	Resumen	CanPres	Ud	Pres	ImpPres
− 2.1	01.01			Concrete gang		hr	144,00	0
2.1.1	01.01.01			Working ganger	1,000	hr	14,00	14,00
2.1.2	01.01.02			Labourers (4nr)	4,000	hr	13,00	52,00
2.1.3	01.01.03			Carpenter in attendance	1,000	hr	18,00	18,00
2.1.4	01.01.04			Poker vibrator (2nr)	2,000	hr	3,00	6,00
2.1.5	01.01.			Concrete pump	1,000	hr	54,00	54,00

Auxiliary price with the concrete equipment

This auxiliary price is entered using the production in a compound price in which the percentage of losses and the proportion of beds and slabs are visible, so that it is easier to verify the result and modify it to adapt it to other situations.

	Código	NatC	Ie	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− *1.1*	*02*			*Reinforced in situ concrete; mix B, 20 mm Original*	*369,00*	*m3*		*5,0000*	*153,99*	*56.822,31*
1.1.1	01.01.06			Concrete price from supplier	1,000	m3			90,00	90,00
1.1.2	01.01.06.20			Waste for concrete in beds	0,075	m3	0,2		90,00	1,35
1.1.3	01.01.06.80			Waste for concrete in slabs	0,050	m3	0,8		90,00	3,60
+ 1.1.4	01.01			Concrete gang	2,050	hr			144,00	59,04

Unit price

Quantities are entered as measure lines, calculating using the dimension columns.

	Tag	Espacio	Comentario	N	Longitud	Anchura	Altura	Fórmula	Cantidad	CanPres	Pres
		Spc0010								369,00	
1	☐	Spc0010	Ground floor slabs	1	30,000	12,000	0,200		72,000		☑
2	☐	Spc0010	Upper floor slabs	3	30,000	12,000	0,275		297,000	369,000	☑

Takeoff lines

However, it is more appropriate to create two different unit prices, as seen below, which can be used regardless of the proportion of slabs and slabs.

Losses can be entered as a percentage type concept, which is applied automatically based on the mask to the left of the "%" character. The percentage is entered as "1%" and adjusted in the factor so that it can be different each time it is used in a work unit. In this way, the concrete price is only entered once and the total volume required in the work can be directly obtained.

	Código	NatC	Ie	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− 1.2	03			*Reinforced in situ concrete; mix B, 20 mm Beds*	*72,00*	*m3*		*5,0000*	*132,75*	*9.558,00*
1.2.1	01.01.06			Concrete price from supplier	1,000	m3			90,00	90,00
1.2.2	01.01.06%			Waste for concrete	0,900		7,5		1,00	6,75
+ 1.2.3	01.01			Concrete gang	1,250	hr			144,00	36,00
− 1.3	04			*Reinforced in situ concrete; mix B, 20 mm Slabs*	*297,00*	*m3*		*5,0000*	*159,30*	*47.312,10*
1.3.1	01.01.06			Concrete price from supplier	1,000	m3			90,00	90,00
1.3.2	01.01.06%			Waste for concrete	0,900		5		1,00	4,50
+ 1.3.3	01.01			Concrete gang	2,250	hr			144,00	64,80

Separate unit prices with losses introduced in percentage-type concepts

It is even easier to enter losses into the concrete factor filed.

	Código	NatC	Ie	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− 1.2	03			*Reinforced in situ concrete; mix B, 20 mm Beds*	*72,00*	*m3*		*5,0000*	*132,75*	*9.558,00*
1.2.1	01.01.06			Concrete price from supplier	1,000	m3	1,075		90,00	96,75
+ 1.2.2	01.01			Concrete gang	1,250	hr			144,00	36,00
− 1.3	04			*Reinforced in situ concrete; mix B, 20 mm Slabs*	*297,00*	*m3*		*5,0000*	*159,30*	*47.312,10*
1.3.1	01.01.06			Concrete price from supplier	1,000	m3	1,05		90,00	94,50
+ 1.3.2	01.01			Concrete gang	2,250	hr			144,00	64,80

Losses directly in the amount

Or do it directly in the quantity, which is easy to see when the base quantity is one unit.

	Código	NatC	Ie	Resumen	CanPres	Ud	Producción	Pres	ImpPres
− 1.2	03			*Reinforced in situ concrete; mix B, 20 mm Beds*	*72,00*	*m3*	*5,0000*	*132,75*	*9.558,00*
1.2.1	01.01.06			Concrete price from supplier	1,075	m3		90,00	96,75
+ 1.2.2	01.01			Concrete gang	1,250	hr		144,00	36,00
− 1.3	04			*Reinforced in situ concrete; mix B, 20 mm Slabs*	*297,00*	*m3*	*5,0000*	*159,30*	*47.312,10*
1.3.1	01.01.06			Concrete price from supplier	1,050	m3		90,00	94,50
+ 1.3.2	01.01			Concrete gang	2,250	hr		144,00	64,80

Losses directly in the amount

First principles

In this case, the estimated total time is first calculated and the cost of the equipment during those days is studied. The overall cost of concrete and the average estimate for losses are added, although in this case the actual measurements of each type could be used.

The total cost is divided by the volume of concrete to compare the unit cost with that obtained previously.

Typical bill description

11 In situ concrete

Reinforced in situ concrete; mix B, 20mm aggregate; horizontal work; .. ≤ 300 thick in structures .. 369m³

item details					analysis				net unit rate
ref.	description	quant	unit	rate	lab	plt	mat	s/c	
	Ground floor beds 30 x 12 x 0.20m	72	m³						
	3nr Upper floor slabs 30 x 12 x 0.275m	297	m³						
		369	m³						
	Assume a bay size of 30 x 4m cast per day								
	Overall time = 4 floors x 3 bays = 12 days								
	Volume of concrete placed per day is:								
	369m3 ÷ 12days = 30.75m3								
Lab	Ganger (12 days x 8 hrs)	96	hr	14.00	1,344				
	Labourers (4nr)	384	hr	13.00	4,992				
	Carpenter	96	hr	18.00	1,728				
Plt	* Poker vibrator (2nr)	192	hr	3.00		576			
	* Concrete pump	96	hr	54.00		5,184			
Mat	Concrete price from supplier	369	m³	90.00			33,210.00		
	Waste 7.5% in beds 20% of volume	5.54	m³	90.00			498.15		
	Waste 5.0% in slabs 80% of volume	14.76	m³	90.00			1,328.40		
	Total for beds and slabs	369	m³		8,064	5,760	35,037		48,861
	Rate for in situ concrete (÷ 369)	1	m³		21.85	15.61	94.95	**	132.41
**	*This rate is less than the previous calculation because it has been assumed that the outputs are the same for beds and slabs*								
*	(plant may be priced in prelims)								

Calculation as operational price

In Presto the same calculation is carried out, adding the number of resources explicitly and the production, which only affects the resources of labour and machinery.

	Código	NatC	Ie	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− 1.4	05			*Reinforced in situ concrete; mix B, 20 mm Operational*	*369,00*	*m3*		*30,7500*	*132,41*	*48.859,29*
1.4.1	01.01.01			Working ganger	8,000	hr			14,00	3,64
1.4.2	01.01.02			Labourers (4nr)	8,000	hr	4		13,00	13,53
1.4.3	01.01.03			Carpenter in attendance	8,000	hr			18,00	4,68
1.4.4	01.01.04			Poker vibrator (2nr)	8,000	hr	2		3,00	1,56
1.4.5	01.01.05			Concrete pump	8,000	hr			54,00	14,05
1.4.6	01.01.06			Concrete price from supplier	1,000	m3			90,00	90,00
1.4.7	01.01.06.20			Waste for concrete in beds	0,075	m3	0,2		90,00	1,35
1.4.8	01.01.06.80			Waste for concrete in slabs	0,050	m3	0,8		90,00	3,60

Operational price in Presto

> *The original text indicates that the unit cost obtained is lower than the previous unit cost because the same production has been assumed for screeds and slabs.*
> *Can the reader check if this explanation is correct before reading on?*

Solution

In the first place, it is rare that the resulting price using averages is lower than that of the two cases separately, and very different from the price of the item with the majority share.

The reality is that a different production has been used in the two ways of calculating the price.

In the unit price, the production per day used is:

Beds: 5 / (1.25 hours / m3) * 8 hours / day = 32.00 m3 / day

Slabs: 5 / (2.25 hours / m3) * 8 hours / day = 17.78 m3 / day

For the operating price, 30.75 m3 / day has been used, thus obtaining a price similar to that of the beds and much lower than that of the slabs.

If the output from the unit price analysis is correct, the approximate average output would be:

0.2 / 32 + 0.8 / 17.78 = 19.51 m3 / day

With this production, the operational analysis of the price coincides exactly with the calculated variable cost.

	Código	NatC	Ie	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− 1.4	05			*Reinforced in situ concrete; mix B, 20 mm Operational*	*369,00*	*m3*		*19,5100*	*153,99*	*56.822,31*
1.4.1	01.01.01			Working ganger	8,000	hr			14,00	5,74
1.4.2	01.01.02			Labourers (4nr)	8,000	hr	4		13,00	21,32
1.4.3	01.01.03			Carpenter in attendance	8,000	hr			18,00	7,38
1.4.4	01.01.04			Poker vibrator (2nr)	8,000	hr	2		3,00	2,46
1.4.5	01.01.05			Concrete pump	8,000	hr			54,00	22,14
1.4.6	01.01.06			Concrete price from supplier	1,000	m3			90,00	90,00
1.4.7	01.01.06.20			Waste for concrete in beds	0,075	m3	0,2		90,00	1,35
1.4.8	01.01.06.80			Waste for concrete in slabs	0,050	m3	0,8		90,00	3,60

Operating price with production used in unit prices

If, on the contrary, the production of the operating price is correct, which is most likely, the base production of the equipment can be calculated from that value:

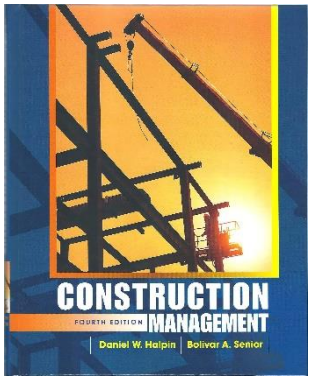
Production (m3 / hour) = (72 m3 x 1.25 + 207 m3 x 2.25) / 96 hours = 7.90 m3 / hour

We replace the production of the example of 5 m3 / h by this value in Presto and obtain prices whose amounts, both by averages and separately, coincide with each other and with the one calculated operationally.

	Código	NatC	Resumen	CanPres	Ud	Producción	Pres	ImpPres
− **1**	**11**		**In situ concrete**	1		0	146.538,00	146.538,00
+ *1.1*	*02*		*Reinforced in situ concrete; mix B, 20 mm Original*	*369,00*	*m3*	*7,9000*	*132,32*	*48.826,08*
+ *1.2*	*03*		*Reinforced in situ concrete; mix B, 20 mm Beds*	*72,00*	*m3*	*7,9000*	*119,53*	*8.606,16*
+ *1.3*	*04*		*Reinforced in situ concrete; mix B, 20 mm Slabs*	*297,00*	*m3*	*7,9000*	*135,51*	*40.246,47*
+ *1.4*	*05*		*Reinforced in situ concrete; mix B, 20 mm Operational*	*369,00*	*m3*	*30,7500*	*132,41*	*48.859,29*

Prices with the correct production

Halpin, Construction management. John Wiley & Sons Inc, 2010



Unit prices

Activity code	Activity description	Material description	Quantity	Unit	Cost code
1	Layout	Stakes 2 x 4 x 24 8 ea.	10.3	BF	0100
3	Place rebar	#5 st. 2 PCS 16 – 2	32.3	LF	0320
		Tie wire	1	Roll	0320
4	Cost and cure	footing			
		Concrete	1.23	CY	0330
		Curing compound	.25	Gal	0337
5	Erect CMU wall				
		CMU 8 x 8 x 16 stretcher	143	Ea	0412
		CMU 8 x 8 x 16 corner	14	Ea	0412
		CMU 8 x 8 x 16 corner	16	Ea	0412
		Scaffolding 4' x 4' x 6'	2	Sec.	0100
		Mortar	.27	CY	0412
7	Form bond beam				
		2 x 4 (4 – 15' – 0")	43.5	BF	0310
		2 x 2	12.7	BF	0310
		1 x 2	2.0	BF	0310
		3/4" ext ply	60.3	SF	0310
		Snapties 8"	24	Ea	0310
		Nails 8d	1.5	Lb	0310
		Nails 6d	.4	Lb	0310
		Form oil	.07	Gal	0310
8	Place bond beam rebar				
		#6 rebar (str.)	28.67	LF	0320
9	Cost and cure	Bond beam			
		Concrete	.35	CY	0330
		Curing compound	.05	Gal	0337
10	Strip forms and rub bond beam				
		Grout	1	CF	0339.2

List of activities and materials p. 287

The calculation method is manual, as can be seen because the same concepts have different names on the same page (concepts in green in the Presto image) and in the sum of quantities list (concept in red).

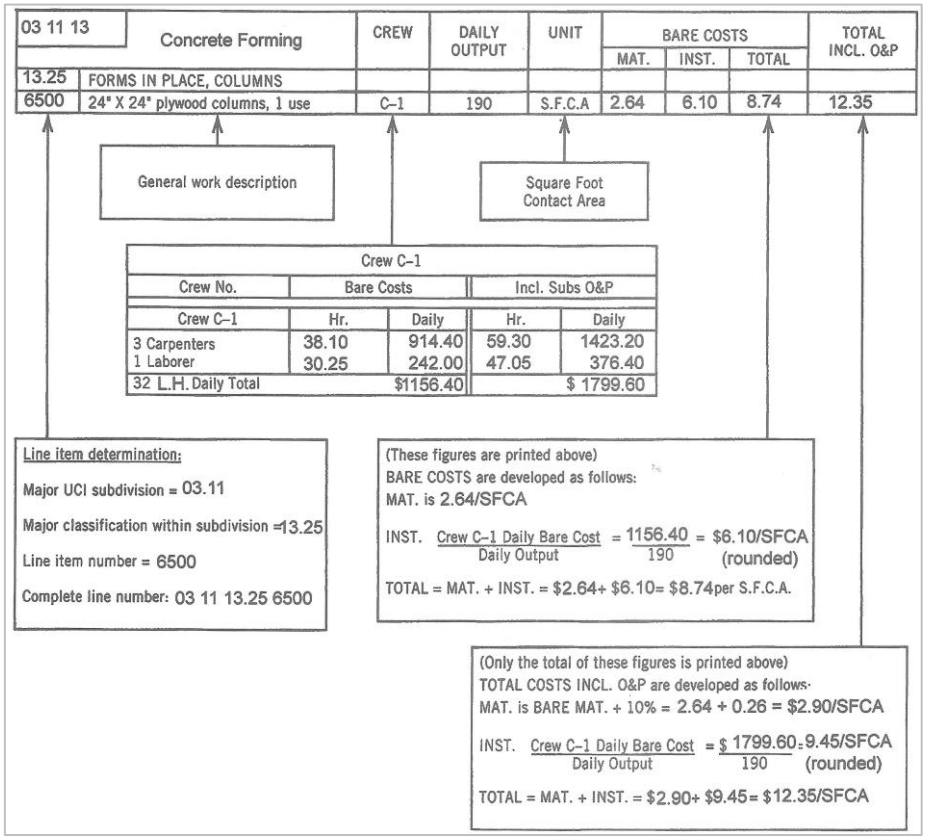
Description	Activity code	Sub-quantity	Waste	Total quantity	Unit		Cost code
2 x 4 Lumber	Total	53.8	10%	60.0	BF		
	1	10.3					0100
	7	43.5					0310
2 x 4 Lumber	7	12.7	10%	14.0	BF		0310
1 x 2 Lumber	7	2.0	10%	2.25	BF		0310
3/4" Exterior plywood	7	60.3	10%	66	SF		0310
Curing compound	Total	.30		1	Gal		0337
	4	.25					
	9	.05					
Snap ties 8"	7	24.	5%	25	Ea		0310
Nails 8d	7	1.5		3	LB		0310
Nails 6d	7	.4		1	LB		0310
Form oil	7	.07		.25	Gal		0310

Materials Summary

In Presto, prices are calculated and the total amount is obtained in the same step. Concepts in gray are not on the previous addition sheet.

	Código	NatC	Resumen	CanPres	Ud	Código2	CanTotPres
− 1	00		**Activity p. 287**	1			1,00
− 1.1	1		*Layout*	*1,00*			*1,00*
1.1.1	01.01.00		Stakes 2 x 4 x 24 8 ea.	10,300	BF	0100	10,30
− 1.2	3		*Place rebar*	*1,00*			*1,00*
1.2.1	01.03.01		#5 st. 2 PCS 16 - 2	32,300	LF	0320	32,30
− 1.3	4		*Cost and cure footing*	*1,00*			*1,00*
1.3.1	01.04.02		Concrete	1,230	CY	0330	1,23
1.3.2	01.04.03		Curing compound	0,250	Gal	0337	0,25
− 1.4	5		*Erect CMU Wall*	*1,00*			*1,00*
1.4.1	01.05.01		CMU 8 x 8 x 16 stretcher	143,000	Ea	0412	143,00
1.4.2	01.05.02		CMU 8 x 8 x 16 corner	14,000	Ea	0412	14,00
1.4.3	01.05.03		CMU 8 x 8 x 16 corner	16,000	Ea	0412	16,00
1.4.4	01.05.04		Scaffolding 4' x 4' x 6'	2,000	Sec.	0100	2,00
1.4.5	01.05.05		Mortar	0,270	CY	0412	0,27
− 1.5	7		*Form bond beam*	*1,00*			*1,00*
1.5.1	01.07.01		2 x 4 (4 - 15' - 0")	43,500	BF	0310	43,50
1.5.2	01.07.02		2 x 2 (4)	12,700	BF	0310	12,70
1.5.3	01.07.03		1 x 2	2,000	BF	0310	2,00
1.5.4	01.07.04		3/4" ext ply	60,300	SF	0310	60,30
1.5.5	01.07.05		Snapties 8"	24,000	Ea	0310	24,00
1.5.6	01.07.06		Nails 8d	1,500	Lb	0310	1,50
1.5.7	01.07.07		Nails 6d	0,400	Lb	0310	0,40
1.5.8	01.07.08		Form oil	0,070	Gal	0310	0,07
− 1.6	8		*Place bond beam rebar*	*1,00*			*1,00*
1.6.1	01.08.01		#6 rebar (str.)	28,670	LF	0320	28,67
− 1.7	9		*Cost and cure*	*1,00*			*1,00*
1.7.1	01.09.01		Concrete	0,350	CY	0330	0,35
1.7.2	01.09.02		Curing compound	0,050	Gal	0337	0,05
− 1.8	10		*Strip forms and rub bond beam*	*1,00*			*1,00*
1.8.1	01.10.01		Grout	1,000	CF	0339.2	1,00

Prices calculated in Presto and total quantities



Explanation of a price according to R.S. Means

	Código	NatC	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− **2**	**03 11 13**		**Concrete forming p. 289**	1		0	0	0	0
2.1	*03 11 13.25*		*Forms in place, columns*	*1,00*		*0*	*0*		*0*
− *2.2*	*03 11 13.25 6500*		*24" x 24" plywood columns, 1 use*		*SFCA*			*12,37*	*0*
− 2.2.1	C-1		Crew C-1	1,000	Hr		190,0000	9,47	9,47
2.2.1.1	C-1 CARP		Carpenters	8,000	Hr	3		59,30	7,49
2.2.1.2	C-1 LAB		Laborer	8,000	Hr	1		47,05	1,98
2.2.2	MAT		Material	1,000		1,1		2,64	2,90

The same price formed in Presto

Operational prices

The calculation of the operating price of concrete is based on a team, with a fixed production per hour, but it is complicated by using loss percentages, which affect the concrete, and efficiency factors, which affect the team, different in each component (slabs, walls, beams) and sometimes at each level.

It is also unnecessary to repeat the calculation when the price is the same, as in the two units of beams and walls, which can be entered more easily using take-off lines associated with the same work unit.

Concrete Placing Crew

Quantity	Member	Rate	Total/Hour
1	Carpenter foreman	$40.00	$ 40.00
2	Cement masons	$36.00	$ 72.00
1	Pumping engineer	$38.00	$ 38.00
7	Laborers	$28.00	$196.00
1	Concrete pump	$24.00	$ 24.00
		Crew hourly rate	$370.00

Production rate of crew under normal circumstances (efficiency factor 1) = 12 cu yd/hr.
Average labor cost/cubic yard = $370/12 = $30.83.

Area	Quantity	Percent Waste	Efficiency Factor	Labor Cost/ Cubic Yard	Activity Cost
1. Foundation	53.2	15	0.9	$34.25	$ 1,822
2. Wall to elevation 244.67	52.9	12	0.8	38.54	2,039
3. Slab 10 in.	1.3	30	0.3	102.77	134
4. Beams elevated 244.67	10.5	15	0.7	44.04	462
5. Beams elevated 245.17	9.1	15	0.7	40.44	401
6. Slab elevation 244.67	8.7	10	0.7	40.44	383
7. Interior wall to 244.67	5.5	15	0.4	77.07	424
8. Slab elevation 254.17	6.3	10	0.75	41.11	259
9. Walls 244.67 −254.17	57.2	10	0.8	38.54	2,205
10. Walls 254.17 −267	42.0	10	0.8	38.54	1,619
11. Floors elevated 267	8.9	10	0.9	34.25	305
12. Manhole walls	27.3	10	0.85	36.27	990
13. Roof	14.0	15	0.7	44.04	617
14. Headwall	8.5	10	0.8	38.59	328
Total direct labor cost for concrete					$11,988 say $12,000

Operational calculation of concrete price (labour only)

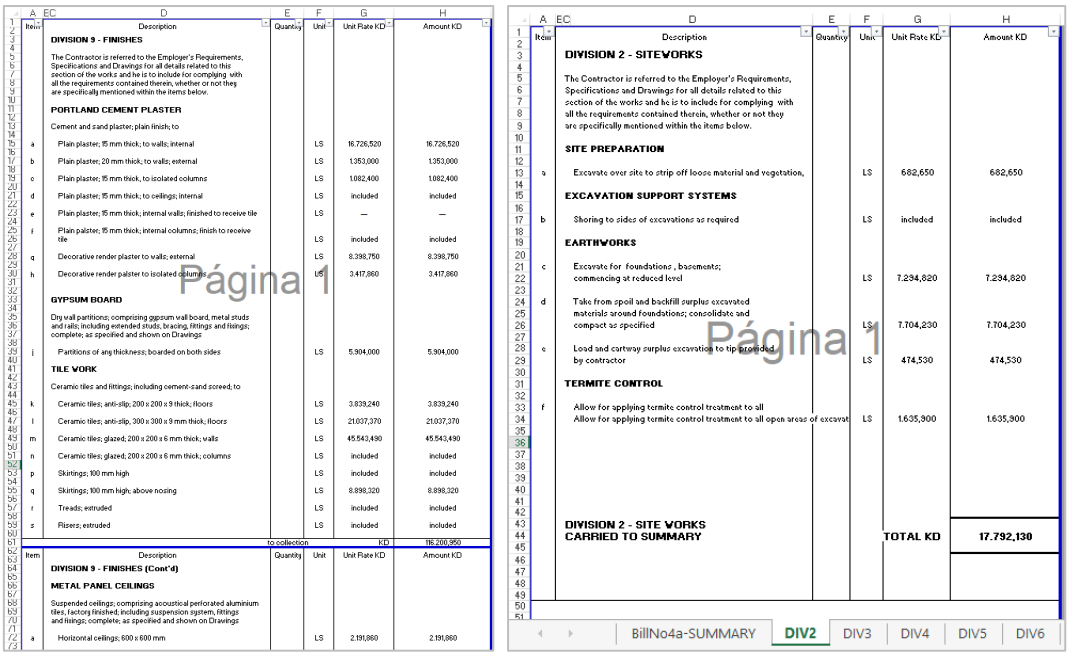
	Código	NatC	Resumen	CanPres	Ud	Factor	Producción	Pres	ImpPres
− 3	02.03		Concrete resource based p. 294	1	CY	0	0	11.953,78	11.953,78
− 3.1	02.03.02		Foundation	53,20	CY		0,9000	34,26	1.822,63
− 3.1.1	CREW		Concrete Crew	1,000	Hr		12,0000	30,83	34,26
3.1.1.1	02.04		Carpenter foreman	1,000	Hr	1		40,00	3,33
3.1.1.2	02.05		Cement masons	1,000	Hr	2		36,00	6,00
3.1.1.3	02.06		Pumping engineer	1,000	Hr	1		38,00	3,17
3.1.1.4	02.07		Laborers	1,000	Hr	7		28,00	16,33
3.1.1.5	02.08		Concrete pump	1,000	Hr	1		24,00	2,00
3.1.2	02.03.02.02		Concrete	1,000	CY	1,15			0
+ 3.2	02.03.03		Wall	52,90	CY		0,8000	38,54	2.038,77
+ 3.3	02.03.04		Slab 10 in.	1,30	CY			102,77	133,60
+ 3.4	02.03.05		Beams	33,60	CY			44,04	1.479,74
+ 3.5	02.03.06		Slab	8,70	CY			44,04	383,15
+ 3.6	02.03.07		Interior wall	5,50	CY			77,08	423,94
+ 3.7	02.03.08		Slab	5,50	CY			41,11	226,11
+ 3.8	02.03.09		Wall	107,70	CY			38,54	4.150,76
+ 3.9	02.03.19		Floors	8,90	CY			34,26	304,91
+ 3.10	02.03.20		Manhole walls	27,30	CY			36,27	990,17

The same price in Presto

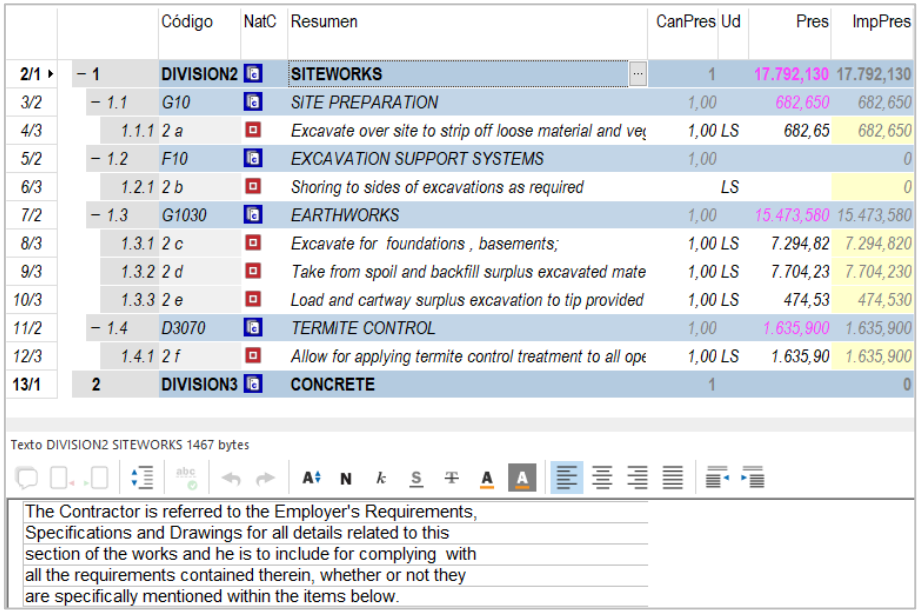
The estimate

As already mentioned, the lack of a standard format forces to deliver the estimates in Excel and many times in PDF documents, which cannot be processed digitally, even in supposedly BIM environments.

The format of the figure below is usual, an Excel sheet paginated in such a way that the rudimentary coding, based on the letters of the alphabet, restarts on each page, within the same chapter, generating duplicate references.



Examples of Valued Bill of Quantities



The estimate of the right Excel sheet in Presto