
Undergraduate Certificate in Civil Engineering Quantity Surveying (United Kingdom)

Measurement And Quantities

Measurement in quantity surveying is the systematic process of determining the size, dimensions, and quantities of construction works. It forms the backbone of cost estimating, tendering, and contract administration. The term is often paired with quantities, which refer to the numerical values derived from measurement that are used to calculate monetary values. Understanding the precise meaning of each term is essential for accurate billing and for avoiding disputes.

Unit of measurement – The standard quantity used to express a measurement. In the United Kingdom, the primary units are the metric system (metre, square metre, cubic metre) and the imperial system (foot, square foot, cubic foot). While modern contracts favour metric units, many legacy drawings and specifications still use imperial measurements, requiring surveyors to be fluent in both.

Length – The most basic linear measurement, expressed in metres (m) or feet (ft). Length is the foundation for calculating other dimensions such as area and volume. For example, a concrete beam that is 6 m long, 0.3 M wide, and 0.5 M deep has a volume calculated by multiplying these three lengths together.

Area – The two-dimensional measurement of a surface, expressed in square metres (m²) or square feet (ft²). Area can be derived from plan drawings (planimetric measurement) or from site surveys using total stations or laser scanners. A typical example is the floor area of a room, which is required for heating and ventilation calculations as well as for determining the amount of floor finishes needed.

Volume – The three-dimensional measurement of space, expressed in cubic metres (m³) or cubic feet (ft³). Volume is crucial for earthworks, concrete, and excavation works. For instance, the cut-and-fill volume for a site grading operation is calculated by comparing the existing ground surface (as-built) with the proposed design surface (as-designed).

Mass – The quantity of matter in a material, expressed in tonnes (t) or kilograms (kg). Mass is often required when material specifications are based on weight rather than volume, such as steel reinforcement or aggregates. Converting between mass and volume requires knowledge of the material's density.

Density – The ratio of mass to volume, typically expressed in tonnes per cubic metre (t/m³). Density values are published in the British Standard BS 8500 for concrete, BS 5950 for steel, and other codes. For example, the typical density of reinforced concrete is 2.4 T/m³, meaning that each cubic metre of concrete weighs 2.4 Tonnes.

Specific weight – The weight per unit volume, expressed in kilonewtons per cubic metre (kN/m³). Specific weight is used in structural calculations to determine loads on foundations. The specific weight of water is 9.81 kN/m³, while that of dry sand is around 18 kN/m³.

Take-off – The process of extracting quantities from drawings, models, or site measurements. Take-offs can be manual (using scales and rulers) or digital (using CAD or BIM software). A take-off for a wall might list

the length, height, thickness, and type of finish, each of which is multiplied by appropriate unit rates to produce a cost estimate.

Bill of Quantities (BoQ) – A structured document that lists all measured items, each with a description, unit, quantity, and rate. The BoQ is the basis for competitive tendering and for interim payment applications. A typical BoQ entry includes a work item number, a brief description (e.G., “External brickwork”), the unit of measurement (e.G., “M²”), the measured quantity, and the agreed unit price.

Schedule of Rates – A document that provides unit prices for standard items of work. It is used in conjunction with the BoQ to calculate the contract sum. Rates are derived from market data, historical costs, and supplier quotations. For example, the schedule may list a rate of £85 per m² for plasterboard installation.

Provisional Sum – An allowance included in the contract for work that cannot be fully defined at the time of tender. The provisional sum is a fixed amount that the contractor may claim against if the work is required. Common provisional sums include “provision for specialist lighting” or “allowance for unforeseen ground conditions”.

Contingency – A percentage of the total contract value set aside to cover unexpected costs. Contingency is not a line item in the BoQ but is added to the overall estimate. Typical contingency percentages range from 5 % for well-defined projects to 15 % for high-risk developments.

Allowance – A fixed amount allocated for items that are not fully detailed, similar to a provisional sum but usually smaller in scale. Allowances are often used for finishes, fittings, or equipment where the exact specification may be decided later in the project.

Cross-section – A cut through a three-dimensional object that reveals its shape and dimensions at a specific location. Cross-sections are essential for verifying the thickness of walls, the depth of foundations, and the profile of ducts. They are usually drawn at a scale of 1:20 Or 1:50.

Planimetric measurement – The measurement of areas on a horizontal plane, ignoring any vertical component. This is the standard method for calculating floor areas, roof areas, and land parcels. Planimetric measurement is performed using drawing scales, digital tools, or GPS-based field surveys.

Vertical measurement – The measurement of heights, depths, or elevations. It is used for calculating volumes (by combining with planimetric areas) and for establishing design levels. Vertical measurements are often taken with levelling instruments, total stations, or laser levels.

3D measurement – The process of capturing the full three-dimensional geometry of a structure or site. Modern techniques include laser scanning, photogrammetry, and LiDAR. 3D measurement enables accurate volume calculations for complex shapes such as irregular excavations or curved roof surfaces.

Laser scanning – A rapid method of acquiring dense point clouds that represent the geometry of a building or terrain. The point cloud can be processed to produce meshes, which are then measured using specialized software. Laser scanning is particularly valuable for refurbishment projects where existing conditions must

be recorded precisely.

Photogrammetry – The technique of deriving measurements from photographs taken at known positions. By overlapping images, a three-dimensional model can be generated. Photogrammetry is often used for large site surveys where laser scanning may be impractical.

LiDAR (Light Detection and Ranging) – A remote-sensing method that uses laser pulses to measure distances to the ground or objects. LiDAR data produces high-resolution elevation models, which are essential for earthworks calculations and flood risk assessments.

Digital Terrain Model (DTM) – A representation of the ground surface, typically derived from LiDAR or survey data. A DTM is used to compute cut-and-fill volumes, to design drainage systems, and to evaluate site accessibility.

Digital Surface Model (DSM) – Similar to a DTM but includes the heights of buildings, trees, and other objects on the surface. DSMs are useful for visualisation, for clash detection in BIM, and for planning tall-building shadows.

Building Information Modelling (BIM) – A collaborative digital environment that stores geometric and non-geometric data about a building. BIM enables automatic quantity extraction (known as “5D BIM” when cost is added) and improves coordination among designers, contractors, and quantity surveyors.

Quantity extraction – The process of pulling measured values directly from a BIM model. Extraction can be performed for elements such as walls, floors, services, and furniture. Accurate quantity extraction reduces the risk of manual errors and speeds up the tender preparation stage.

Unit rate – The price assigned to a single unit of work, such as £120 per m³ of concrete. Unit rates are applied to measured quantities to calculate the cost of each line item. Unit rates may include labour, plant, materials, and overheads, depending on the contract type.

Labour cost – The portion of the unit rate that covers wages, benefits, and related expenses for workers. Labour cost is often expressed as a percentage of the total unit rate, for example, 30% labour, 40% materials, and 30% plant and overheads.

Plant cost – The cost associated with equipment and machinery required to perform a task, such as a tower crane, excavator, or concrete pump. Plant rates can be fixed (e.g., A daily hire charge) or variable (e.g., Cost per hour of operation).

Material cost – The price of the raw or finished products used in construction, such as bricks, steel bars, or tiles. Material costs are subject to market fluctuations, and quantity surveyors must regularly update price books to reflect current rates.

Overheads – Indirect costs incurred by contractors that are not directly attributable to a specific work item, such as site offices, utilities, and insurance. Overheads are usually expressed as a percentage added to the direct costs.

Profit margin – The amount of profit a contractor expects to earn on a project, added on top of direct costs, plant, material, and overheads. Profit margins vary by market conditions, risk levels, and client expectations.

Measurement standards – The set of rules that define how quantities should be measured and recorded. In the UK, the principal standard is the RICS New Rules of Measurement (NRM), which includes NRM 1 (pre-contract), NRM 2 (post-contract), NRM 3 (building works), and NRM 4 (civil engineering works).

NRM 1 – Order of Cost Estimating – Provides guidance on estimating costs before a contract is awarded. It defines measurement rules for preliminary cost estimates, including allowances and provisional sums.

NRM 2 – Order of Cost Planning – Covers detailed cost planning during the design stage. It introduces the concept of “cost modeling” and aligns quantities with the project’s timeline.

NRM 3 – Order of Measurement for Building Works – The most widely used standard for measuring building works. It defines how to measure elements such as walls, floors, roofs, and services. NRM 3 also specifies rules for “gross” versus “net” measurements.

NRM 4 – Order of Measurement for Civil Engineering Works – Tailored for infrastructure projects, including highways, railways, and utilities. It provides guidance on measuring earthworks, pavement, drainage, and structural works.

Gross measurement – The total physical size of an element, including any openings, voids, or recesses. For example, the gross area of a wall includes the area occupied by windows and doors.

Net measurement – The measurement of an element after deducting openings, services, or other exclusions. Net measurement is used when the cost is based on the actual material required. In a Wall BoQ, the net area would be the gross wall area minus the area of windows and doors.

Deduction – The subtraction of quantities that are not part of the work being measured. Deductions are applied for openings, penetrations, or overlaps. Accurate deduction calculations prevent over-billing.

Overlap – The portion of a work item that is counted more than once due to intersecting elements. For example, a floor slab may be measured both as a separate slab and as part of the sub-structure; overlapping must be resolved to avoid double counting.

Measurement tolerance – The permissible deviation between measured quantities and actual quantities, expressed as a percentage or a fixed amount. Tolerances are set out in contract documents to define when a variation is considered “minor” and may be settled without formal variation procedures.

Variation – Any change to the scope of works that alters the quantity, cost, or time required. Variations can be “additions” (extra work) or “omissions” (work removed). They are usually documented through a Variation Order and may affect the contract sum.

Change order – A formal document that records a variation, including the revised quantities, unit rates, and impact on the contract sum. Change orders must be signed by both the client and contractor before the work proceeds.

Valuation – The process of assessing the value of work performed to date, for the purpose of interim payment applications. Valuation is based on measured quantities, rates, and any approved variations. Accurate valuation reduces the risk of payment disputes.

Interim payment – A partial payment made to the contractor based on the value of work completed up to a certain date. Interim payments are typically submitted monthly and are assessed against the measurement and valuation.

Final account – The concluding financial statement that reconciles all measured quantities, variations, provisional sums, and final costs. The final account determines the final amount payable to the contractor or the client's final liability.

Retention – A percentage of each interim payment that is held back by the client as security for the satisfactory completion of the work. Retention is usually 5% of each payment and is released upon practical completion or after a defect-clearance period.

Practical completion – The stage at which the works are sufficiently complete for the client to occupy or use the building. Practical completion triggers the release of most retained monies and the start of the defects liability period.

Defects liability period – A period after practical completion during which the contractor must rectify any defects identified by the client. The period is usually 12 months for new builds and may be longer for complex facilities.

Measurement of earthworks – Earthwork measurement is a core activity in civil engineering projects. It involves calculating cut (excavated) and fill (embankment) volumes. The most common methods are the average end-area method, the prismatic formula, and digital terrain modelling.

Average end-area method – Calculates volume by averaging the areas of two consecutive cross-sections and multiplying by the distance between them. This method is simple but can be inaccurate for irregular surfaces.

Prismatic formula – Provides a more accurate volume estimate by using the areas of the end sections and the intermediate section. The formula is $V = (L/6) \times (A1 + 4A_m + A2)$, where L is the distance, A1 and A2 are the end areas, and A_m is the middle area.

Digital terrain modelling – Uses DTM data to compute volumes automatically. Software can slice the surface at the design level, calculate the cut and fill, and generate a volume report. This method is fast and highly accurate for large sites.

Compaction – The process of increasing the density of soil or aggregate by applying mechanical energy. Compaction is measured in terms of % maximum dry density, as determined by a Proctor test. Quantity surveyors must account for the additional material required to achieve the specified compaction.

Backfill – The material placed behind retaining structures, foundations, or pipe trenches. Backfill quantity is usually measured in cubic metres and may be classified as "clean fill", "contaminated fill", or "recycled

aggregate”.

Reinforcement measurement – The measurement of steel bars (rebars) required for concrete structures. Reinforcement is quantified by weight (tonnes) or by length (kilometres) and is derived from the bar diameter, spacing, and length. For example, a 12 mm bar spaced at 200 mm over a 10 m length yields a specific weight that can be calculated using the formula: $\text{Weight} = \text{length} \times \text{unit weight of steel}$.

Unit weight of steel – Approximately 78.5 kN/m (or 7.85 T/m³). Using this value, a 12 mm bar of 10 m length weighs about 0.94 Kg per metre, giving a total weight of 9.4 Kg for the 10 m length.

Formwork measurement – The measurement of temporary structures used to shape concrete. Formwork is measured in square metres (surface area) or in “formwork days” – the number of days a formwork element remains in place. Formwork rates often include labour, material, and plant.

Pre-cast concrete measurement – Pre-cast elements are measured by the number of units, each unit having a known size and weight. The quantity surveyor must verify the dimensions and weight of each element against the manufacturer’s data sheet.

Surveying tolerances – The permissible deviation in field measurements, often expressed in millimetres for high-precision surveys. For example, a total station may have a distance tolerance of $\pm 1 \text{ mm} + 1 \text{ ppm}$, meaning the error increases with the length measured.

Chainage – The distance measured along a centreline, commonly used in road and railway projects. Chainage is recorded in metres and is essential for locating utilities, drainage, and structural elements.

Stationing – Similar to chainage but expressed as a station (e.G., 12 + 300 M), which simplifies referencing locations along linear infrastructure. Stationing is used in design drawings, construction reports, and as-built documentation.

Set-out – The process of marking the positions of structures on the ground before construction begins. Accurate set-out ensures that the measured quantities correspond to the design intent.

As-built measurement – The measurement of works after construction, reflecting any deviations from the design. As-built quantities are used for final accounts, maintenance planning, and future refurbishment projects.

Measurement of services – Includes plumbing, HVAC, electrical, and fire-protection systems. Services are measured by length (e.G., Metres of pipe), number of fittings (e.G., Valves), or area (e.G., Ductwork cross-section). Service measurement often requires coordination with multiple disciplines to avoid double counting.

Pipework measurement – Calculated by length, diameter, and material type. For example, a 100 mm diameter steel pipe of 50 m length has a volume derived from the pipe’s internal diameter, which is then multiplied by the density of steel to obtain a weight.

HVAC duct measurement – Measured by cross-sectional area (m²) and length (m). Duct volume is the

product of area and length, and the weight is obtained using the material's density (often galvanized steel). Duct work often includes fittings such as elbows and transitions, each of which is measured separately.

Electrical conduit measurement – Similar to pipework, measured by length and diameter. Conduit weight is derived from the material density (e.G., PVC or steel). Conduit measurement must also account for accessories such as trunking, boxes, and fittings.

Fire-protection system measurement – Includes sprinklers, hydrants, and pipework. Sprinkler heads are counted individually, while pipework is measured by length. Fire-protection rates often include a fixed component for design and installation, plus a variable component based on pipe length.

Construction plant measurement – Plant usage is measured by time (hours or days) or by output (e.G., Cubic metres of earth moved). Plant rates may be fixed (e.G., A daily hire charge) or variable (e.G., Cost per hour of operation). Accurate plant measurement is essential for cost control, especially on large earthworks projects.

Excavation measurement – Determined by the cut volume, which is the difference between the existing ground surface and the designed excavation depth. The volume is expressed in cubic metres, and the cost may include a unit rate for excavation, a surcharge for difficult ground, and a plant rate for the excavator.

Compaction factor – A multiplier used to adjust the volume of backfill material to account for the increase in density after compaction. For example, a compaction factor of 1.15 Means that for every cubic metre of loose material, 1.15 M³ of compacted material is required.

Survey adjustment – The process of correcting raw survey data to improve accuracy, often using least-squares adjustment. Adjusted data provides more reliable measurements for quantity calculation.

Datum – A reference point or level from which elevations are measured. Common datums in the UK include Ordnance Survey datum (OD) and the national vertical datum (NAP). Using a consistent datum is vital for ensuring that vertical measurements are comparable across the project.

Leveling – The technique of determining the relative height of points using a level instrument and staff. Leveling provides accurate vertical measurements for setting foundation levels, checking slab elevations, and verifying drainage gradients.

Stakeout – The physical placement of markers on the ground to indicate the position of proposed works. Stakeout marks are used by contractors to guide excavation, foundation placement, and structural alignment.

Geotechnical measurement – Geotechnical data includes borehole depths, soil classifications, and groundwater levels. Quantity surveyors use this data to estimate excavation volumes, determine suitable fill material, and assess the need for ground improvement.

Soil classification – Categorised according to the British Standard BS 5930 (e.G., Clay, silt, sand, gravel). Different soil types have different densities and compaction characteristics, influencing the quantity and cost of earthworks.

Ground improvement measurement – Includes techniques such as vibro-compaction, stone columns, or geotextile reinforcement. Measurement may be expressed in terms of the number of columns, the length of geotextile, or the volume of stabilising material.

Utility relocation – The process of moving existing services to accommodate new construction. Relocation is measured by the length and type of service, the number of connections, and the complexity of the diversion. Provisional sums are often included for unforeseen utility conflicts.

Construction sequencing – The order in which works are carried out. Accurate measurement must consider sequencing to avoid double counting. For example, a temporary ramp used during construction is measured separately from the permanent access road.

Temporary works measurement – Includes scaffolding, shoring, and temporary roads. These items are measured by area (e.G., Scaffolding coverage), length (e.G., Temporary road length), or by “man-hours” for installation and dismantling.

Scaffolding measurement – Typically expressed in square metres of platform area or in “scaffold bays”. Rates may include a daily hire charge plus a removal fee.

Shoring measurement – Measured by the length of the shoring wall and the depth of support. Shoring rates often include a fixed component for equipment and a variable component for labour.

Measurement of finishes – Finishes such as plaster, paint, tiles, and flooring are measured by area. For example, wall plaster is measured in square metres, while floor tiling may be measured in square metres plus a wastage allowance (commonly 5 %).

Wastage allowance – An additional percentage added to the measured quantity to account for material loss during installation. Wastage percentages vary by material; for example, 2 % for paint, 5 % for tiles, and 10 % for timber.

Joint measurement – The measurement of connections between elements, such as expansion joints, control joints, and construction joints. Joint measurement is usually expressed in linear metres and may have a fixed unit price.

Measurement of demolition – Demolition quantities are measured by volume (for bulk material) or by area (for wall stripping). Demolition rates often include a surcharge for hazardous material handling and disposal.

Disposal measurement – The volume of waste material that must be removed from the site. Disposal is measured in cubic metres and is charged according to the landfill fee schedule, which varies by region and waste type.

Recycling measurement – Some projects require a proportion of waste to be recycled. Recycling rates are based on the weight of material recovered. Quantity surveyors must track both the amount sent to landfill and the amount diverted to recycling facilities.

Health and safety considerations – Safety requirements can affect measurement, particularly when additional space is required for safe access or for protective barriers. For example, a safety buffer zone around a high-voltage line may be measured as a non-chargeable area.

Regulatory compliance measurement – Certain regulations dictate minimum dimensions, such as fire-resistance walls or accessibility ramps. Compliance measurement ensures that the measured quantities meet statutory requirements.

Building code requirements – The UK Building Regulations set out specific measurement criteria for fire escape routes, ventilation, and structural loadings. Quantity surveyors must verify that the measured quantities align with these codes to avoid costly rework.

Measurement of structural steel – Structural steel is measured by weight, derived from the cross-sectional area and length of each member. The weight of a steel beam can be calculated using the formula: $\text{Weight} = \text{area} \times \text{length} \times \text{density}$. The density of steel is approximately 7850 kg/m^3 .

Fabrication tolerances – The allowable deviation in manufactured steel components. Fabrication tolerances affect the measurement of connections and may require adjustments on site, which are captured as variations.

Measurement of foundations – Foundations are measured by volume (for pad or strip footings) or by area (for raft foundations). Depth is a critical factor; deeper foundations increase the volume and, consequently, the cost.

Pile measurement – Piles are measured by number, length, and diameter. Pile rates may include a fixed cost per pile plus a variable cost per metre of penetration. Additional costs such as pile caps and headstocks are measured separately.

Retaining wall measurement – Retaining walls are measured by the length of wall, height, and thickness. The volume of concrete required for the wall is calculated using these dimensions, and reinforcement is measured separately.

Roadway measurement – Includes sub-base, base, and surface layers. Each layer is measured in cubic metres, with specific unit rates for material supply, placement, and compaction. The width of the carriageway and the length of the alignment determine the total volume.

Drainage measurement – Drainage works are measured by the length of pipe, diameter, and type (e.g., PVC, ductile iron). Manholes, catch basins, and inspection chambers are measured by number and size.

Surface water management – Measured by the area of swales, detention basins, and permeable paving. The capacity of detention basins is measured in cubic metres, while swale length and width are measured in metres.

Railway measurement – Involves track alignment, ballast depth, and sleeper spacing. Track work is measured by linear kilometres, with ballast volume calculated from the cross-sectional area and length.

Bridge measurement – Includes deck area, abutments, piers, and foundations. Bridge decks are measured in square metres, while piers are measured in cubic metres. Reinforcement for bridge elements is measured by weight.

Tunnel measurement – Tunnels are measured by length, cross-sectional area, and volume of lining. Lining material is measured in cubic metres, and reinforcement in tonnes. Ventilation and lighting systems are measured separately.

Measurement of landscaping – Landscaping items such as planting, turf, and hard-scape features are measured by area (e.G., M² of lawn) or by number (e.G., Number of trees). Planting rates often include a labour component and a material component.

Soft-ground measurement – Soft-ground works, such as ground improvement or stabilization, are measured by the area treated and the depth of treatment. For example, a soil stabilisation program may be measured in m² × depth (m).

Measurement of temporary utilities – Temporary water, electricity, and communications services provided during construction are measured by the duration (days) and the capacity required (e.G., KVA for electricity). Temporary utility rates are usually daily charges.

Measurement of security works – Includes fencing, CCTV, and access control systems. Fencing is measured by linear metres, while CCTV cameras are counted individually. Security works may be subject to special procurement rules.

Measurement of signage – Signage is measured by the number of signs, size (e.G., M²), and type (e.G., Illuminated, non-illuminated). Signage rates often include design, fabrication, installation, and maintenance.

Measurement of acoustic treatments – Acoustic panels and insulation are measured by area (m²) and thickness. Acoustic performance specifications may require a minimum density, influencing the material choice and cost.

Measurement of fire-stopping – Fire-stopping works are measured by the number of penetrations, the size of each penetration, and the type of fire-stop product. Fire-stop rates are often fixed per penetration.

Measurement of glazing – Glazing is measured by area, with consideration for the type of glass (e.G., Double-glazed, triple-glazed) and frame system. Special glazing (e.G., Low-emissivity) may attract a premium rate.

Measurement of roofing – Roofing is measured by area (m²) and by type (e.G., Pitched, flat, membrane). Roof insulation is measured by area and thickness, while roof drainage (e.G., Gutters, downpipes) is measured by linear metres.

Measurement of waterproofing – Waterproofing membranes are measured by area, with allowances for overlaps and waste. The rate may include a fixed component for preparation and a variable component for material.

Measurement of external works – External works include paving, kerbing, and site furnishings. Paving is measured in square metres, kerbing in linear metres, and site furniture (e.G., Benches) by unit.

Measurement of interior partitions – Partitions are measured by area, height, and thickness. Dry-wall partitions are often measured in square metres, while solid brick partitions are measured in square metres of net wall area.

Measurement of ceilings – Suspended ceilings are measured by area, with allowances for ceiling tiles, grid, and accessories. Acoustic ceilings may have an additional rate for acoustic performance.

Measurement of services coordination – Coordination of multiple services (e.G., Ductwork crossing pipework) is measured by the number of coordinated points. Coordination rates may be fixed per point or per hour of coordination work.

Measurement of commissioning – Commissioning involves testing and verification of services. Commissioning is measured by the number of test points, hours of labour, and any special equipment required.

Measurement of warranties – Warranty periods are not measured in physical units but are expressed in time (years). Warranty costs are often expressed as a percentage of the total contract sum.

Measurement of post-construction surveys – As-built surveys are measured by the area surveyed, the level of detail (e.G., 1 Mm accuracy), and the technology used (laser scanner, total station). Survey rates may be hourly or per square metre.

Measurement of sustainability features – Sustainable measures such as solar panels, rainwater harvesting, and green roofs are measured by capacity (kW for solar), area (m² for green roof), or volume (litres for storage tanks). These features often attract specific funding or tax incentives.

Measurement of BIM deliverables – BIM deliverables are measured by the level of development (LOD) required (e.G., LOD 300, LOD 400). The cost of BIM services is often expressed as a percentage of the construction cost or as a fixed fee per model.

Measurement of risk – Risk is quantified using probability and impact, expressed in monetary terms. Risk quantification feeds into contingency allowances and informs the selection of provisional sums.

Measurement of inflation – Inflation is accounted for by applying an escalation factor to the base rates. Common escalation indices include the Construction Cost Index (CCI) and the Building Cost Information Service (BCIS) index.

Measurement of currency conversion – For projects involving foreign suppliers, rates may be quoted in foreign currency. Currency conversion is performed using the agreed exchange rate, and any fluctuation is captured as a variation.

Measurement of time-related costs – Some costs are time-dependent, such as plant hire or labour rates that increase after a certain period. Time-related costs are measured by the number of days or weeks.

Measurement of inflation escalations – Escalation clauses may specify a percentage increase per annum. The measurement of escalated costs requires the application of the appropriate index to the original unit rate.

Measurement of performance bonuses – Performance bonuses are linked to the achievement of specific targets (e.G., Early completion, safety milestones). Bonuses are measured as a fixed amount or a percentage of the contract sum.

Measurement of liquidated damages – Liquidated damages are pre-agreed sums payable for delay, measured in monetary terms per day of delay beyond the agreed completion date.

Measurement of extension of time – An extension of time (EOT) is a contractual allowance that postpones the completion date. The measurement of the impact of an EOT includes the additional cost of plant, labour, and overheads for the extended period.

Measurement of interim valuations – Interim valuations are performed at regular intervals (e.G., Monthly). The measurement for each valuation includes the cumulative quantities measured to date, less any deductions for rejected work.

Measurement of final account reconciliation – The final account reconciles all measured quantities, variations, provisional sums, and any adjustments. The measurement must be exhaustive to ensure that no items are omitted or double-counted.

Measurement of dispute resolution – In the event of a dispute, measured quantities may be reviewed by an independent expert. The expert's measurement forms the basis for adjudication or arbitration.

Measurement of insurance claims – Insurance claims for damage or loss are measured by the cost of repair or replacement. The measurement may include demolition, disposal, and reconstruction quantities.

Measurement of value engineering – Value engineering seeks to reduce cost while maintaining function. The measurement of alternatives involves comparing the quantities and rates of different design options.

Measurement of sustainability reporting – Sustainability reports often require the quantification of embodied carbon, which is measured in tonnes of CO₂e. Embodied carbon is calculated by multiplying material quantities by their carbon factors.

Measurement of carbon footprint – The carbon footprint of a construction project includes embodied carbon (materials) and operational carbon (energy use). Quantity surveyors contribute by providing accurate material quantities for the embodied portion.

Measurement of life-cycle costing (LCC) – LCC assesses the total cost of ownership over the asset's life. It combines initial construction quantities with future maintenance, operation, and disposal quantities.

Measurement of maintenance schedules – Maintenance quantities are measured by the frequency of tasks (e.G., Annual, quarterly) and by the area or number of items to be serviced (e.G., M² of painted surface, number of HVAC filters).

Measurement of refurbishment works – Refurbishment measurement often involves “take-off from as-built” and “design to demolish”. Quantities are derived by comparing the existing condition to the proposed design, with allowances for hidden works.

Measurement of heritage works – Heritage projects require careful measurement of original features. Conservation works are measured by the number of features restored, the area of plaster repair, or the length of historic masonry.

Measurement of contractual risk – Contractual risk is quantified by identifying the probability of occurrence and the monetary impact.