

# **Introduction to Measurement of Building Works (EQS 3134)**

# Course Synopsis

One of the responsibilities for Quantity Surveyor (QS) is preparing Bill of Quantities. This course highlighted to the learners about the components, formats, methods and principles that applied by QS through the measurement skills to obtain quantities of building works.



# Course Objective (s)

To explain an understanding of Quantity Surveying roles in construction projects.

To demonstrate a knowledge of methods and principles applied for measurement of building works in order to produce accurate Bill of Quantities.

To practice measurement skills adhered with the standard method(s) of measurement and codes for sub-structure of building works.



# Course Outline



- 1) Introduction
- 2) Measurement Techniques
- 3) Measurement Task
- 4) Specification

## Content outline of the subject and the SLT per topic

### 1. Introduction:

Quantity Surveying roles, Bills of quantities, Contents of bills of quantities, Usage of bills of quantities, Preparation of bills of quantities and Format of bills of quantities.

### 2. Measurement Techniques:

Relationship between measurement concept and cost, The application of measurement work in construction work, mathematical and/or mensuration techniques in order to assist the measurement process and Standard Method of Measurement (SMM2), contents and application.

### 3. Measurement Task:

Preparing the measurement for the substructure work:

A. Work Below Lowest Floor Finish including excavation and temporary work, strip footing, column bases, pile caps, column stump, ground beams, ground slab, thickening, hardcore, damp proof membrane etc.

B. Apron and Perimeter Drain.

### 4. Specification

- Purpose and use of the specification
- Subject matter
- Form of the specification
- Specification work sections

# Assessment Methods

Course Work : 50%

Final Examination : 50%

# Main References

- a. Building Quantities Explained; 2000, I H Seeley; Longmans.
- b. Elements of Quantity Surveying; 2002 Willis & Trench ; E & FN Spoon.
- c. Malaysian Standard Method of Measurement of Building Works 2; Institution of Surveyors Malaysia (ISM); 2001, ISM.

# TOPIC 1

## INTRODUCTION OF QUANTITY SURVEYING



# Introduction

Quantity Surveyor (QS) as known as building economist appointed by building owner which responsible manage cost and contracts for any construction projects.

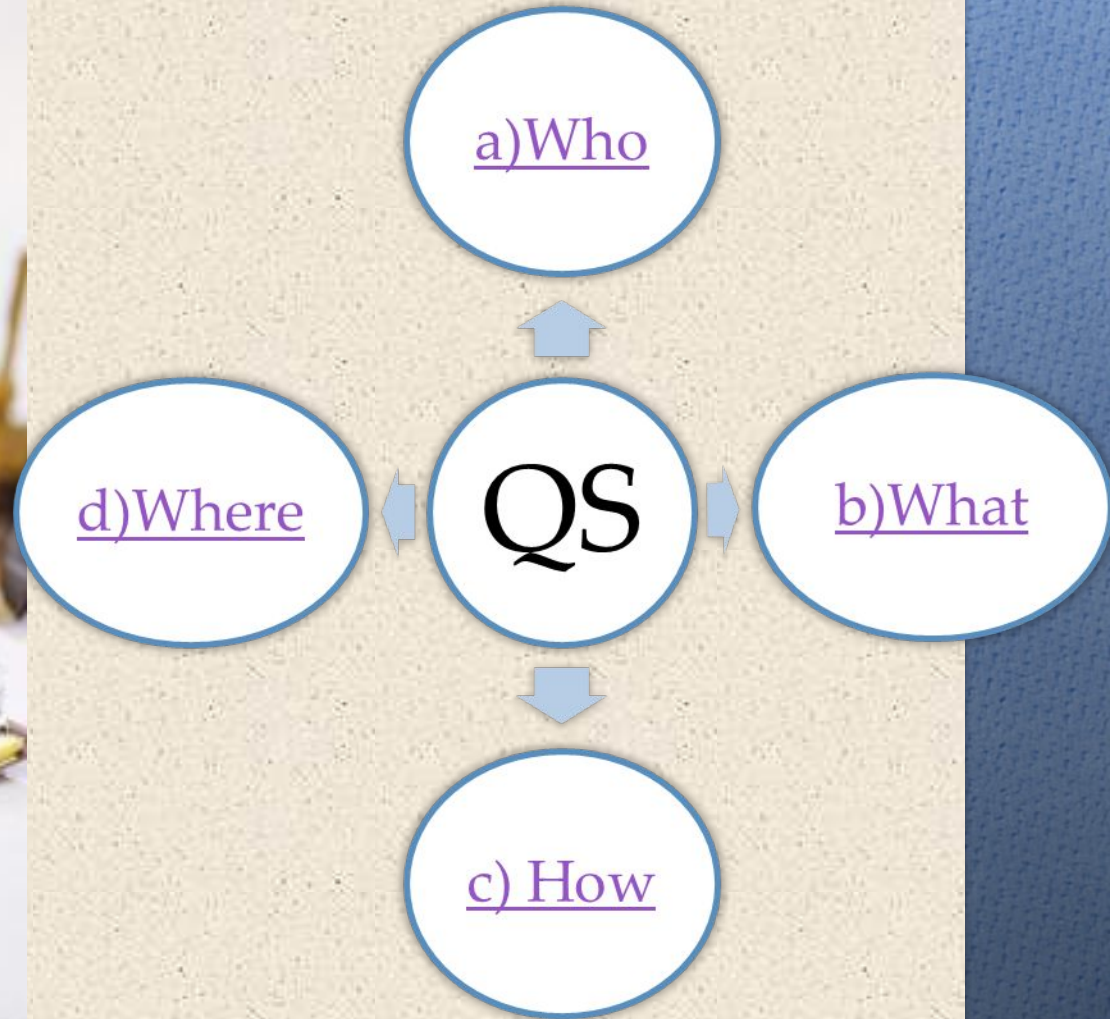
Technically, QS called estimator, one of the uniqueness skills required is *taking off or measurement of quantities* in order producing Bill of Quantities.

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BILL NO. 2 - BUILDING WORKS

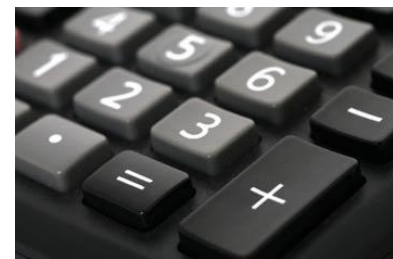
Item	Description	Unit	Qty.	Rate (RM)	Amount (RM)
<b>ELEMENT NO. 2 - FRAME</b>					
<i>Vibrated reinforced concrete Grade 30 as described, in</i>					
A	Columns.	m3	54	240.00	12,960.00
B	Beams.	m3	90	240.00	21,600.00
C	Roof beams.	m3	63	240.00	15,120.00
<i>Mild steel bar reinforcement as described</i>					
D	6mm Diameter in columns (links).	kg	511	4.30	2,197.30
E	6mm Diameter in beams (stirrups).	kg	1,088	4.30	4,678.40
F	10mm Diameter in beams (stirrups).	kg	1,969	4.30	8,466.70
G	6mm Diameter in roof beams (stirrups).	kg	1,109	4.30	4,768.70
H	10mm Diameter in roof beams (stirrups).	kg	267	4.30	1,148.10



WHO?

# QUANTITY SURVEYING~

- 0 QUANTITY SURVEYOR (QS) is a construction professional
- 0 QS is **qualified** and **adequately trained** to **advise** on all aspects of **construction costs, financial and contractual administration**
- 0 **Advises the client** on appropriate contract arrangement as well as the legal contract and conditions under which the building will be constructed.



# ~ QUANTITY SURVEYING ~

- o QS: Acting on behalf of the **CLIENT** □ Advises the Architect and Engineer on the cost implications such as:
  - (i) different construction methods
  - (ii) alternative choice of materials and size
  - (iii) quality of the project.
- o To ensure that each element is reconciled with the cost plan allowance □ **overall project cost remains within the budget.**
- o An **expert** on the cost and **management** of **construction projects** □
  - (a) building, (b) civil or (c) heavy engineering

# ~ QUANTITY SURVEYING ~

o Whenever any building project is proposed, it is important that **the cost** involved is known in advance.

o These include :

- Site preparation cost
- Construction
- Labour
- Material and plant costs
- Professional fees, taxes and other charges
- Running and maintenance costs for the new building.



# ~ QUANTITY SURVEYING ~

o QS must be able to assess

- (i) Implications of changes in design,
- (ii) Site conditions and working arrangements and
- (iii) Give the client accurate **budget and time estimates**



WHAT?

# QUANTITY SURVEYING~

a) Basic Service

b) Supplementary Service

SCOPE  
OF  
SERVICES



# ~ QUANTITY SURVEYING ~

Measurement

Procurement

Estimation

Payment

a) BASIC  
SERVICE

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graph TD; Measurement[Measurement] --> Service((a) BASIC SERVICE); Procurement[Procurement] --> Service; Estimation[Estimation] --> Service; Payment[Payment] --> Service;
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# ~ QUANTITY SURVEYING ~

## o i) ESTIMATION:

o **ESTIMATION** □ The **process** of **calculation** the **quantities** of various items of work, and the expenses **likely** to be incurred.

o The **estimated cost** of a work is a **close approximation** of its **actual cost (by measuring)**

o **Purpose** □ **to give** the owner a **reasonably accurate idea of the cost** to help him decide whether the work can be undertaken as proposed or needs to be curtailed or abandoned, depending upon the availability of funds and prospective direct and indirect benefits.

# ~ QUANTITY SURVEYING ~

## i) ESTIMATION (Cont'd):

- o **Under-estimating** □ client getting an unpleasant shock when tenders are opened and drastically modifying or abandoning the work at that stage
- o **Over-estimating** □ estimator will lose his client or his job, or in any case his confidence.
- o This knowledge is used □ construction of new building with new design
- o Also **based on Estimators' experienced & knowledge** □ since it based on **architectural drawing**



# ~ QUANTITY SURVEYING ~

## i) ESTIMATION (Cont'd):

- **Example:** The cost of brickwork in a building would be determined as below:

(i)	<i>Cost of Material</i>	<i>RM</i>
	(a) Brick	
	(b) Cement	
	(c) sand	
	(d) Water	
(ii)	<i>Labor Cost</i>	<i>RM</i>
	(a) skilled	
	(b) Unskilled	
<b>(iii)</b>	<b>Total of Material &amp; Labor Cost</b>	<b>RM</b>
<b>(iv)</b>	<b>Cost of plant</b>	<b>RM</b>
<b>(v)</b>	<b>Cost of handling &amp; transportation</b>	<b>RM</b>
<b>(vi)</b>	<b>Overhead &amp; profit</b>	
	<b>TOTAL COST OF BRICKWORK</b>	<b>RM</b>

# ~ QUANTITY SURVEYING ~

## i) ESTIMATION(Cont'd):

0 By using this estimating knowledge, a QS will be able:

- Preparation of **preliminary cost estimates and cost plans** of the development project.
- **Advise on cost estimates** in relation to design development of a project.



# ~ QUANTITY SURVEYING ~

## ii) MEASUREMENT:

- 0 **MEASUREMENT** □ The process of controlling the construction cost by accurate measurement of the work required
- 0 **Measurement** □ Also known as **"TAKING-OFF"**
- 0 The quantities are measured from drawings and specifications prepared by architects and engineers  
□ known as **"Bill of Quantities (BQs)"**
- 0 **Purpose** □ in order to prepare tender @ contract documents



# ~ QUANTITY SURVEYING ~

## ii) MEASUREMENT(Cont'd):

By using this measurement knowledge, a QS will be able:

To prepare the **Bill of Quantities** or Specification document for tendering purposes.

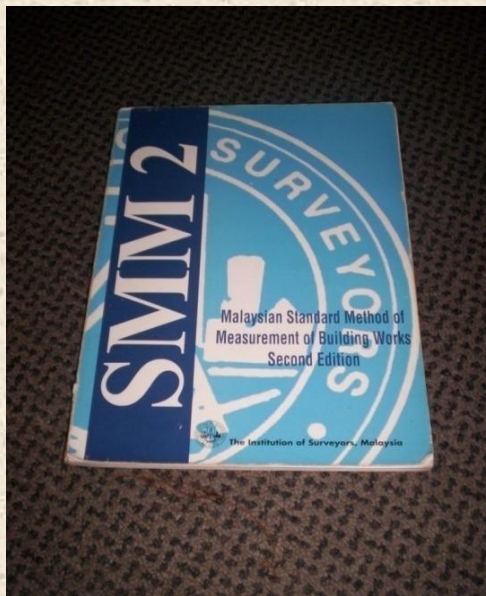


# ~ QUANTITY SURVEYING ~

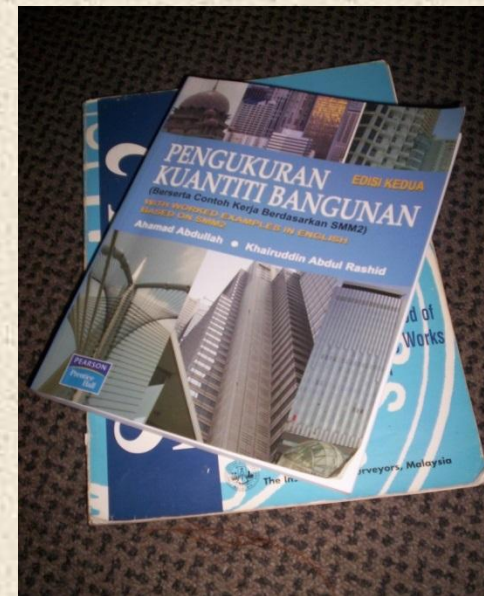
## ii) MEASUREMENT (Cont'd):

o BQs are prepared in accordance to:

(a) Malaysian Standard Method of Measurement of **Building Works** (SMM 2)



(b) Malaysian Standard Method of Measurement of **Civil Engineering Works** (CESMM)



# ~ QUANTITY SURVEYING ~

## iii) PROCUREMENT:

- o Generally  **PROCUREMENT** refer to *“The action or process of acquiring or obtaining material, property, or services at the operational level”* for example, purchasing, contracting, and negotiating directly with the source of supply”
  
- o BUT, the term **PROCUREMENT** is widely used in different context such as:
  - (i) Commerce
  - (ii) Defence
  - (iii) Construction**



# ~ QUANTITY SURVEYING ~

## iii) PROCUREMENT (Cont'd):

- 0 **CONSTRUCTION PROCUREMENT** □ The process of acquiring the construction project
- 0 7 main element of the process of construction procurement & may be divided into 2 broad categories:

### (a) Pre-Construction Stage (Before the Construction)

- 0 Initiation
- 0 Funding
- 0 Design □ Schematic, Detailed, Specialist
- 0 Statutory approval
- 0 Tendering □ Open, Selective, Negotiated

# ~ QUANTITY SURVEYING ~

## iii) PROCUREMENT (Cont'd):

### (b) Construction Stage (*During the Construction*)

- o Construction □ involved Management & physical construction process
- o Risk allocation

2

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# ~ QUANTITY SURVEYING ~

## iii) PROCUREMENT (Cont'd):

o There are 2 main types of system of **CONSTRUCTION PROCUREMENT** in Malaysia such as:

(a) Traditional system

(b) Design & Build @ Turnkey system

o Apart from that there are also a few new System like **Management Based system** (*Built, Operate, Transfer*) and **Innovative System** (*PFI, Partnering, Privatisation*)



# ~ QUANTITY SURVEYING ~

## iv) PAYMENT:

- 0 **CONSTRUCTION PAYMENT** □ The process of paying /transfer of money or goods for the construction works done.
- 0 A QS will be able to:
  - 0 Prepare the Interim valuation of works in progress on site for purposes of interim payments.
  - 0 Prepare the financial statement of regular intervals during the construction period.
  - 0 Do a settlement of the final accounts of the project.

# ~ QUANTITY SURVEYING ~

b) **Supplementary services** may also be provided by the

Professional Quantity Surveyor if required:

- Preparation of feasibility studies of a project.
- Projection of estimated project or development expenditure and anticipated income cash flows.
- Evaluation of **contractors** registered for prequalification.
- Comparative cost studies on the economics of the project during design stage.
- **Project management** of construction project.

# ~ QUANTITY SURVEYING ~

## Supplementary services (*Cont'd*):

- Life-cycle costing and studies on economics of alternative design.
- Pricing of Bills of Quantities or negotiating and agreeing Schedule of Rates.
- Valuation or auditing of contractual claims for arbitrations litigation cases.
- Valuation or auditing of insurance claims for fire damaged buildings.
- Auditing of contracts and their related budgets and expenditure.
- Application of the full scope of quantity surveying services in Turnkey or Privatisation Contracts.

HOW?

# QUANTITY SURVEYING

**PROFESSIONAL  
BODY**

**BQSM**  
(Board of Quantity  
Surveyor Malaysia)



**ISM ( The  
Institution of  
Surveyor  
Malaysia)**



# ~ QUANTITY SURVEYING ~

## BQSM:

- 0 The **Board of Quantity Surveyors Malaysia** was set up by an Act of Parliament, i.e. Registration of Quantity Surveyors Act 1967, Act 487 (revised 1992).
- 0 The Board consists of a President, a Registrar and sixteen (16) members appointed by the Minister of Works, Malaysia.
  - 0 To keep and maintain a register of quantity surveyors in Malaysia
  - 0 To keep and maintain a register of firms and bodies corporate practicing as consulting quantity surveyors in Malaysia.
  - 0 To hear and determine disputes relating to professional conduct or ethics of quantity surveyors.
  - 0 To determine and regulate the professional conduct and ethics of the quantity surveying profession in Malaysia.





# ~ QUANTITY SURVEYING ~

## ISM:

The **Institution of Surveyors, Malaysia (ISM)** is the professional institution representing the surveying profession in Malaysia and consists of four main divisions, namely :

- Property Consultancy Valuation Surveying Division
- Geomatic and Land Surveying Division
- **Quantity Surveying Division**
- Building Surveying Division



# ~ QUANTITY SURVEYING ~

## ISM:

- 0 Then known as “The Malayan Institution of Surveyors”, and the First Council Meeting of the Institution was held on 14 December 1961.
- 0 At the E.G.M held on 19 June, 1966, the name of the Institution was changed to the **“Institution of Surveyors, Malaysia (ISM)”**
  - 0 To continuously improve the standards of professional practice and ethics
  - 0 To promote the welfare and professional development of members
  - 0 To expand by incorporating related disciplines into the profession



WHERE!

# QUANTITY SURVEYING~

Quantity Surveyors may work in a variety of sectors such as :

- ❑ Private consultancies
- ❑ Government agencies
- ❑ Educational institutions
- ❑ Construction companies
- ❑ Property developers
- ❑ Banks
- ❑ Financial institutions
- ❑ Commercial organizations



# References

- 1) Ahamad Abdullah, Khairuddin Abdul Rashid, *Pengukuran Kuantiti Bangunan (Beserta Contoh Kerja Berdasarkan (SMM2)*, 2003, Prentice Hall.
- 2) *Malaysian Standard Method of Measurement of Building Works 2*; Institution of Surveyors Malaysia (ISM); ISM; 2001
- 3) Ivor H. Seeley, *Building Quantity Explained (3<sup>rd</sup> Edition)*, 1979, Southeast Asian Reality



Q & A

Last Updated:\*