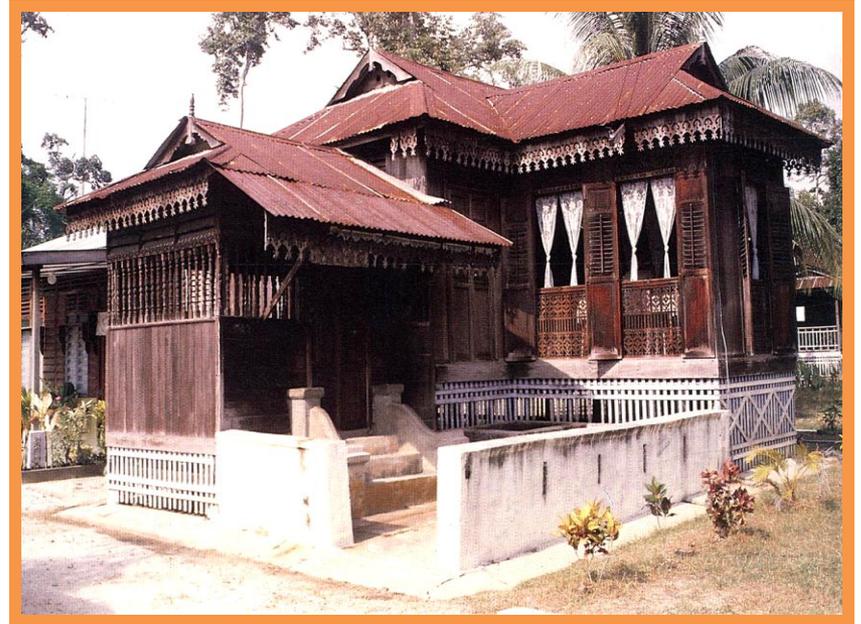


Construction Measurement III / SBQ3314

Introduction To Electrical & Mechanical Works

Dr. Sarajul Fikri Mohamed

Traditional Building



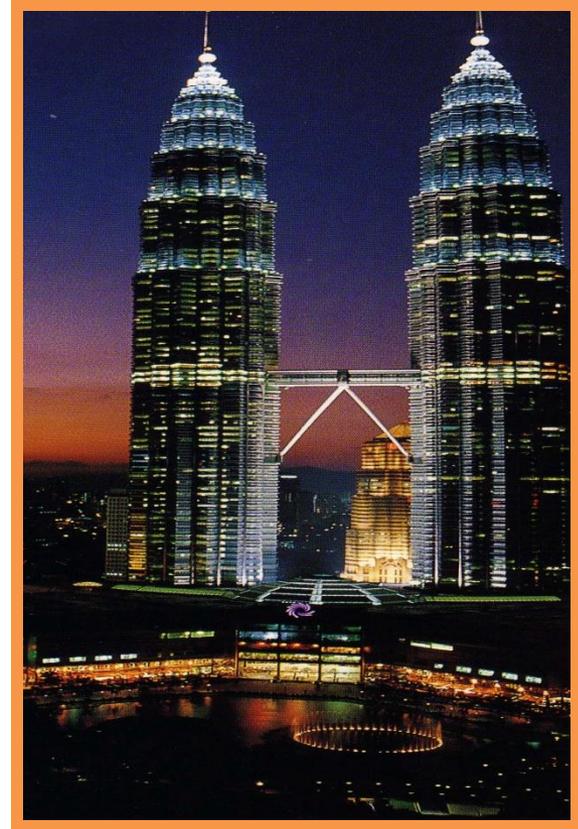
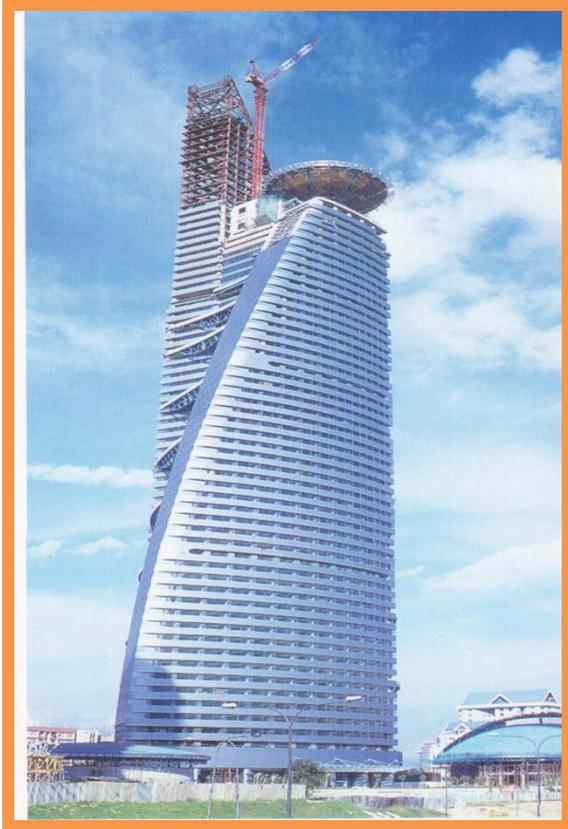
Purpose of M&E Measurement

1. To determine element and components that involved to the M & E works.
2. To measure according to the latest standard method of measurement SMM2.
3. To protect the interest of the client and the contractor.
4. The information derived from a priced BQ to aid the construction planning networks.
5. A tool for cost control in mechanical and electrical services.
6. To minimize future disagreement.

Building Services Cost (McCaffrey, 2011)

TYPE OF BUILDING	PERCENTAGE OF THE TOTAL COST
Warehouse	10 to 15%
Apartment	15 to 20%
School	20 to 25%
Shopping complex	20 to 30%
Hotel	30 to 40%
Offices	35 to 45%
Hospital	40 to 55%
Data Centre	60 to 70%

Smart Building



Building Elements

ELEMENTAL ANALYSIS

Substructure

Superstructure

Internal Finishing

Fitting and Furnishing

Services

External Works

Preliminaries

Electrical Installations



Air-Conditioning Installations

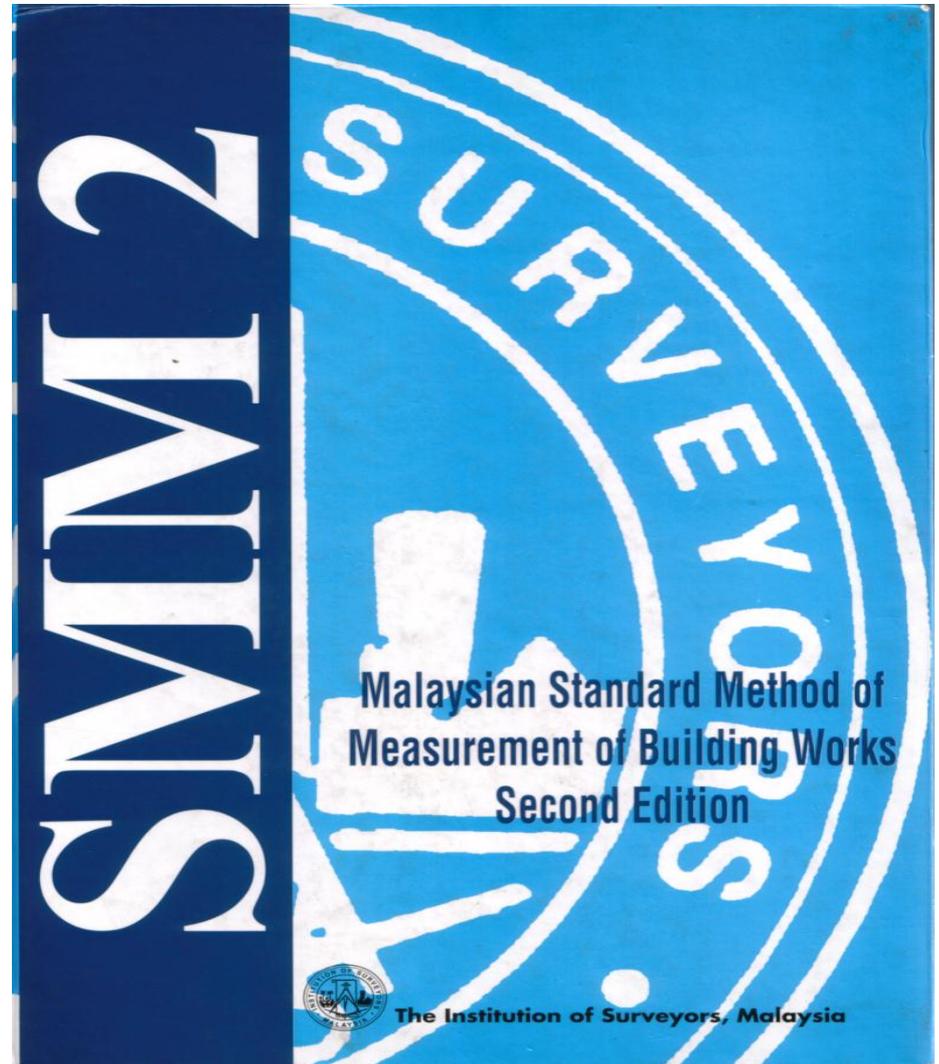


Fire Fighting Installations



**MECHANICAL &
ELECTRICAL WORKS
MEASUREMENT RULES**

**Standard Method of
Measurement of Building Works
SECOND EDITION**



Studio Works

PROJECT DRAWINGS

- Read and check drawing
- Drawing numbering and scale used.
- Taking off list
- Heading and Description
- Take off
- Annotation
- Query list
- Final checking



Submission to Course Tutor

Studio Works Grading

ITEM	DESCRIPTION	WEIGHTAGE
1	Taking off List and Unit	20
2	Description and Heading	30
3	Quantity Measurement	30
4	Annotation and Side Cast	10
5	Query List	10
	TOTAL	100

M&E Works and Bill of Quantities

Traditionally, much of M&E Works was included in BQs as prime cost sums.

It was largely presented in this way for three main reasons

- **M&E Engineers often failed to provide the appropriate details in time for quantification purposes.**
- **It was not the custom to measure M&E works.**
- **Contractors often preferred to offer lump sum quotations on the basis of drawing and specification only.**



Clients realised that this approach was not very satisfactory in determining where the actual costs for this work are being expended

The Needs for QS

- To provide an accurate cost control function for only part of building project is **UNSATISFACTORY**.
- The M&E Works is **more extensive and expensive and its costs, value** and cost control must be as accurate as the methods applied on the remainder of the construction project.
- QS have had to become **more familiar with building services** in their science, technology, terminology, in order to quantify engineering drawing correctly.

Skills and Knowledge For QS

KNOWLEDGE

- **Construction technology**
- **Measurement rules**
- **Construction economics**
- **Financial management**
- **Business administration**
- **Construction law**



SKILLS

- **Management**
- **Documentation**
- **Analysis**
- **Appraisal**
- **Quantification**

Output

BILL OF QUANTITIES

Summary

[Lord Esher, 1971]

*'On average the mechanical services account for close on **a third of the cost of modern building**'*

References

1. The Institution of Surveyors, Malaysia (2000). *Standard Standard Method of Measurement of Building Works Second Edition (SMM2) Malaysia* : Winston Enterprise.
2. The Institution of Surveyors, Malaysia (2000). *Standard Standard Method of Measurement of Building Works Second Edition (SMM2) – Practice Manual*. Malaysia : Winston Enterprise
3. Luter, M.E and Mc Gowan, M.C (1991). *Building Engineering Services - A Practice Manual for Quantity Surveyors (Vol. 2 - Electrical Services Technology)*. Nottingham : Nottingham Polytechnic HED.
4. Framptom, D.I. (1991). *Building Engineering Services - A Practice Manual for Quantity Surveyors (Vol. 1 - Mechanical Services Technology)*. London; Longman.
5. Mc Clelland, B and Reifel, M.D. (1986). *Planning and Design of Fixed Offshore Platforms*. Texas : Van Nosrand Reinhold.
6. Production Department American Research Institute (1980). *Primer of Oil and Gas Construction*. Dallas : American Petroleum Institute.
7. Peter, M.S., Timmerhaus, K.D. (1991). *Plant Design and Economics for Chemical Engineers*. Singapore : Mc Graw-Hill.
8. Rosli Abdul Rashid (1987) *Pengenalan Kepada Ukur Kuantiti 1*. Johor Bahru Penerbit UTM.
9. Ching, F.D.K. (1987). *Interior Design Illustrated*. New York : Van Nostrand Reinhold.
10. Rosindell, F.S., Stafford, K.D. (1991). *Building Engineering Services - A Practice Manual for Quantity Surveyors (Vol. 4 - Measurement and Estimating)*. Nottingham : Nottingham Polytechnic HEC.
11. Weinberg, S.S. (1992). *Handbook of Landscape Architectural Construction*. Washington D.C. : Landscape Architecture Foundation.

THANK YOU