

CURTAIN WALLING : A STUDY ON MAINTENANCE ASPECT

**MUZIATI HANAFIAH BT MOHD HANAFIAH
99134233**

**BUILDING SURVEYING DEPARTMENT
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
SHAH ALAM, SELANGOR DARUL EHSAN**

APRIL 2001

Abstract

Rapid development in construction technology and the evolution of high-technology architectural style in Malaysia are two contributing factors to the rising of curtain walling buildings in Malaysia. Curtain walling, which is a glass-clad building circling the whole building externally, which is also functions as building envelope shielding the internal area from external environmental factors.

The crucial issues impacting the curtain walling are the environmental factors. Assessment on the environmental impacts, thus become a necessity when selecting types of materials to be used as curtain walling. Since curtain walling has become such intensive development, life cycle costing is a critical aspect that should be put into consideration.

The specification of glass as curtain walling which allows natural light penetration into the internal sides of the building is the reason on why such material is chosen as building skin. Synchronisation of building material and 'corporate' image that reflecting the building functions are other reasons on why curtain walling system is being adopted, besides the practicality of the construction system.

CONTENTS

Abstract.....	i
Acknowledgement.....	ii
List of Picture.....	iii
List of Figures.....	v
List of Tables.....	ix

1.0 INTRODUCTION

1.1 Introduction	1
1.2 Issue.....	2
1.3 Objective	4
1.4 Hypothesis	5
1.5 Scope.....	6
1.6 Methodology Of Study	7

2.0 BACKGROUND STUDIES

2.1 Definition	8
2.2 Historical Background Of Curtain Walling	10
2.3 Weathering Effect On Curtain Walling.....	13
2.3.1 Wind Effect.....	14
2.3.2 Sun Radiation.....	17
2.3.3 Rain Effect.....	20
2.4 Life Cycle Costing	21
2.4.1 Assessment Method	23
2.4.2 Cost-In-Use Logic	25
2.4.3 Maintenance Repair And Custodial Costs.....	27
2.5 Development Of Curtain Walling In Malaysia.....	29

3.0 CURTAIN WALLING CONSTRUCTION

3.1	General Construction	39
3.1.1	Concept	41
3.1.2	Purpose And Function	42
3.1.3	Technology	43
3.2	Type Of Curtain Walling	44
3.2.1	Stick System	45
3.2.2	Unitised System	47
3.3	Selection Of Glass	49
3.3.1	Heat-Absorbent And Heat Reflective Glass	50
3.3.2	Ceramic Fritted Glass	51
3.3.3	Heat-Strengthened Glass	51
3.3.4	Tempered Glass	52
3.3.5	Laminated Glass	53
3.4	Components Of Curtain Walling	57
3.4.1	Frame	58
3.4.2	Joints And Connection	62
3.4.3	Damp-Proof Membrane	67
3.4.4	Glazed Wall Panels	70

4.0 MAINTENANCE ASPECTS

4.1	Maintenance Theory	73
4.2	Maintenance Purpose And Function	74
4.3	Types Of Maintenance	76
4.3.1	Preventive Maintenance	77
4.3.2	Emergency Maintenance	78
4.4	Maintenance Program	79
4.4.1	Cleaning	80
4.4.2	Preventive Maintenance	80

4.4.3 Servicing And Replacement	81
4.5 Consideration On Maintenance Costs	85
4.5.1 Cost-In-Use	85
4.5.2 Maintenance Technology	86
4.5.3 Forecasting Maintenance Needs	87

5.0 CASE STUDY

5.1 Securities Commission	89
5.1.1 Background Of Building	89
5.1.1.1 Design Concept	90
5.1.1.2 Accommodations	91
5.1.2 Curtain Walling System	93
5.1.2.1 Construction Technology	94
5.1.2.2 Materials	104
5.1.3 Weathering Effects	106
5.1.4 Maintenance Aspect	110
5.1.4.1 Maintenance Program	111
5.1.4.2 Maintenance Cost	118
5.2 Mas Building	121
5.2.1 Background Of The Building	121
5.2.1.1 Design Concept	122
5.2.1.2 Accommodations	122
5.2.2 Curtain Walling System	126
5.2.2.1 Technology	127
5.2.2.2 Materials	136
5.2.3 Weathering Effects	138
5.2.4 Maintenance Aspect	143
5.2.4.1 Maintenance Programme	144
5.2.4.2 Maintenance Cost	150