

Laporan Projek Tahun Akhir
Kursus Diploma Lanjutan Kejuruteraan Awam
Kajian Kejuruteraan, I.T.M Shah Alam

ANALYSIS AND DESIGN OF
LONG SPAN BEAM SECTIONS
UP TO 40 METRE

BY :
MOHD ZAINAL ABIDIN BIN YUSOF
NOVEMBER 1990

ABSTRACT

The aim of this project is to develop a model in designing long span beams. By referring to the model, the beam sizes and the area of reinforcement can easily be determined provided that the loadings and span are known.

Emphasis were given to Reinforced Concrete and Prestressed Concrete design. Spreadsheets were prepared to aid the design based on British Code of Practice, BS 8110 : 1985.

All analysis were made on the results obtained from the spreadsheets. Discussions were done on how the area of reinforcement, breadth and depth of beam changes with the variation of span and loading.

ACKNOWLEDGEMENT

I would like to convey my fullest gratitude to my project advisor, Ir. Dr. Wan Mahmood bin Wan Abd. Majid, Senior Lecturer of the Civil Engineering Department, for his guidance and usefull advise that led to the completion of the project.

I would also like to wish my sincere thanks to lecturers and friends who have in anyway give encouragement, motivation and ideas that led to the progress of the project.

MOHD ZAINAL ABIDIN BIN YUSOF

CONTENTS

ABSTRACT

ACKNOWLEDGMENT

1.0	INTRODUCTION	1
1.1	General	2
1.2	Objective and Scope	3
2.0	REVIEW ON THE DEVELOPMENT OF LARGE SPAN STRUCTURES	4
2.1	Several Approaches for Long Span	5
2.2	Reinforced Concrete Design	5
2.3	Prestressed Concrete Design	6
2.4	Space Structures	10
3.0	DESIGN CONSIDERATIONS	11
3.1	Design for Safety Using Limit State	12
3.2	Characteristic Strength	13
3.3	Characteristic Load	14
3.4	Partial Safety Factors	14
4.0	DESIGN METHODS	17
4.1	Reinforced Concrete Design	18
4.1.1	The Ultimate Limit State	22
4.1.2	The Serviceability Limit State	37
4.2	Prestressed Concrete Design	48
4.2.1	Prestressing Section	48
4.2.2	Method of Prestressing	50
4.2.3	Analysis of Section Properties	53
4.2.4	Design for the Serviceability Limit State	54
4.2.5	Design of End Blocks	73
4.2.6	Design for Ultimate Limit State	76
5.0	CASE STUDY	84
5.1	Reinforced Concrete Design	85
5.2	Prestressed Concrete Design	95
6.0	RESULTS	108
7.0	DISCUSSION	116
7.1	Reinforced Concrete Design	117
7.2	Prestressed Concrete Design	119
7.3	Comparison Between Reinforced Concrete Design and Prestressed Concrete Design	120
8.0	CONCLUSION	122
	REFERENCES	129
	APPENDIX	132

1.0 INTRODUCTION

1.1 GENERAL

Nowadays, in most buildings there is tendency to reduce the number of intermediate columns and as a result the trend is towards long span structures such as beams.

However, there is no specific code that discuss about long span beam. Thus, it is hard to determine how long a span of a beam can practicably be used with the respect to its depth in a building. If the beam is used for outdoor purposes such as for bridges, the depth is not a problem because there are much space available. But in building there is space constraint.