

STUDY ON VIABILITY OF ADOPTING POST TENSIONED SLAB CONSTRUCTION IN SRI LANKA

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Master of Engineering in Structural Engineering Designs

Department of Civil Engineering

**University of Moratuwa
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Thesis submitted in partial fulfilment of the requirements for Master of Engineering
in Structural Engineering Designs

Department of Civil Engineering

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December 2013

Declaration

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters thesis under my supervision.

Signature of the supervisor:

Date:

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Finally, I thank whole heartedly and sincerely to my beloved wife Dr Mrs. R. A. Culas for giving me complete freedom to devote my time to make this course of study a success.

Abstract

This study was undertaken in two phases to identify the viability of adopting post-tensioned slab construction of multi-storied buildings in Sri Lanka.

The phase I comprises the questionnaire survey which dealt with the construction practices of multi-storied buildings in Sri Lanka including slab construction. The advantages, disadvantages and cost comparison were carried out for the reinforced concrete and post-tensioned concrete slabs.

Phase II covers two study parts; one is the work study and the other is designs. For the work study, three building projects were selected and their costs were analysed. It confirms that the main cost in a multi-storeyed building is attributable to the slab and beams. In the design study, designs were separately carried out for the conventional reinforced concrete beams and slab and post-tensioned slabs for three (03) live loads of 1.5 kN/m², 2.5 kN/m² and 5.0 kN/m². Their cost comparisons were carried out for different spans as well.

Results of phase I study shows 75% of the participants in the survey were having more than 10 years of experience in the construction/design fields, and currently 63% of them belong to the private sector. 100% of the participants accepted that the main structural material frequently used in multi-storied buildings in Sri Lanka is reinforced concrete, and 81% accepted that the most costly super structure elements are beams and slabs. Advantages and disadvantages of the reinforced concrete as the structural material are discussed in detail in the report.

13% of the participants possess experience in designing of post-tensioned slabs. However, 94% do not have the experience in construction of post-tensioned slabs. But, some have physically seen post-tensioned slabs construction. 31% of the participants have idea on the cost saving between reinforced concrete and post-tensioned concrete slab. The main conclusion is post-tensioned slab construction is 25% to 35% cheaper than conventional slabs, but not suitable for small spans. Finally, 65% of the participants accepted that post-tensioned slabs in multi-storied building projects are viable in Sri Lanka.

Results of phase II study reveal that the post-tensioned slab is cost effective for spans greater than 6 metres irrespective of the live load applicable.

Table of Content

Declaration	i
Acknowledgements	ii
Abstract	iii
Table of Content	iv
List of Figures	viii
List of Tables	ix
List of Abbreviations	xi
List of Appendices	xii
1.0 INTRODUCTION	1-5
1.1 Background	1
1.2 Objective of the Study	3
1.3 Scope	4
1.4 Methodology	4
1.5 Outline of the Thesis	4
2.0 LITERATURE REVIEW	6-18
2.1 Traditional Practice of Slab Construction in Sri Lanka	6
2.1.1 Conventional reinforced concrete	6
2.1.2 Advantage of conventional reinforced concrete slab	7
2.1.3 Disadvantage or Limitation of conventional reinforced concrete slab	7
2.2 Post-Tensioned Concrete Slab	8
2.2.1 Pre stressing and post-tensioning concrete	8
2.2.2 Advantages and disadvantages of post-tensioned slab	9
2.2.3 Strands used for pre stressing	12

2.2.4 Construction process of post -tensioned slab	14
2.3 Comparison of Post-Tensioned with Conventional Reinforced Concrete Slab	16
2.3.1 Cost	16
2.3.2 Speed of construction	17
3.0 METHODOLOGY	19-27
3.1 Questionnaire Survey	19
3.1.1 Design of the study	19
3.1.2 Study setting	20
3.1.3 Geographical limitation	20
3.1.4 Sampling method	20
3.1.5 Study sample size	20
3.1.6 Selection criteria of participants	20
3.1.7 Study instrument and method of data collection	21
3.1.8 Data analysis	21
3.2 Work Study	21
3.3 Design Study	22
3.3.1 Design of conventional reinforced slab	23
3.3.2 Design of post- tensioned slab	25
3.3.3 Analysis of cost effectiveness of post-tensioned slab	27
4.0 DETAILS OF THE PHASE I STUDY	28-38
4.1 Information on Selected Sample	28
4.2 Traditional Construction Practices in Sri Lanka	30
4.3 Reinforced Concrete Slab	30
4.3.1 Advantages of reinforced concrete	31

4.3.2 Disadvantages of reinforced concrete	31
4.4 Post- Tensioned Slabs	32
4.4.1 Advantages	32
4.4.2 Disadvantages	33
4.5 Cost Comparison between Reinforced Concrete Slabs and Post-Tensioned Concrete Slabs	35
4.6 Viability of Post -Tensioned Slab Construction in Sri Lanka	36
5.0 DETAILS OF THE PHASE II STUDY	39-48
5.1 Results of Work Study	39
5.2 Results of Design Study	40
5.2.1 Designing the conventional slab	41
5.2.2 Designing the post -tensioned slab	42
5.2.3 Cost effectiveness of post -tensioned slab	43
6.0 CONCLUSION AND RECOMMENDATION	49-50
6.1 Conclusion	49
6.2 Recommendations	50
REFERENCES	51-52
APPENDICES	53-63
Appendix A	Sample Questionnaire.....53
Appendix B	Conventional Reinforced Slab Design Spread Sheet for 7mx9m Panel for the Live Load of 1.5 kN/m ²54
Appendix C	Conventional Reinforced Beam Design Spread Sheet for 7m Span for the Live Load of 1.5 kN/m ²55

Appendix D	Required Quantities of Materials for Conventional Reinforced Slabs and Beams for the Live Load of 1.5kN/m ²	56
Appendix E	Unit Rate Calculation for Conventional Reinforced Slab and Beams for 21mx27m Area for the Live Load of 1.5 kN/m ²	57
Appendix F	Post -Tensioned Slab Design Spread Sheet for 7mx9m Panel for the Live Load of 1.5 kN/m ²	58
Appendix G	Conventional Reinforced Beam Design Spread Sheet for 7m for the Live Load of 1.5 kN/m ² for the Post-Tensioned Slab	59
Appendix H	Required Quantities of Materials for the Post-Tensioned Slabs and the Conventional Reinforced Beams for the Live load of 1.5 kN/m ²	60
Appendix I	Unit Rate Calculation for Post-Tensioned Slab and Conventional Reinforced Beams for 21mx27m Area for the Live Load of 1.5 kN/m ²	61
Appendix J	Basic Prices for Accessories for the Post-Tensioned Slab	62
Appendix K	Work Study Spread Sheet for Three Multi-Storied Buildings	63



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List of Figures

Figure No	Description	Page
Figure 2.1	Typical stress-strain curve for 7-wire strand [4]	13
Figure 2.2	A typical draped profile in an elevated concrete slab [6]	15
Figure 2.3	A plastic pocket former installed at the location creates a stressing pocket	15
Figure 2.4	Cost comparisons for conventional reinforced concrete slab Vs post -tensioned flat slab [10]	17
Figure 4.1	Percentage distribution category wise	28
Figure 5.1	Cost comparison of structural elements for three multi-storied buildings	40
Figure 5.2	Unit cost versus span in conventional reinforced slab for live load of 1.5,2.5 & 5 kN/m ²	42
Figure 5.3	Unit cost versus span in post-tensioned slab for the live load of 1.5,2.5 & 5 kN/m ²	46
Figure 5.4	Slab span versus unit cost for the conventional RF slab and post -tensioned slabs for the live load of 1.5 kN/m ²	46
Figure 5.5	Slab span versus unit cost for the conventional RF slab and post -tensioned slabs for the live load of 2.5 kN/m ²	47
Figure 5.6	Slab span versus unit cost for the conventional RF slab and post -tensioned slabs for the live load of 5 kN/m ²	47

List of Tables

Table No	Description	Page
Table 2.1	Main structural materials and their common locations in buildings	6
Table 2.2	Tensile strength of Australian Pre-Stressing steels [4] (AS 3600-1988)	13
Table 3.1	Construction projects selected for the study	22
Table 3.2	Data used in the design of conventional reinforced slab for different live loads	24
Table 3.3	Data used in the design of post-tensioned slab for different live loads	25
Table 4.1	Selected participants and their percentages	29
Table 4.2	Working experience of the participants	29
Table 4.3	Employer category of the participants	29
Table 4.4	Role of the participants in the construction industry	29
Table 4.5	Main super structural elements	30
Table 4.6	Costly super structural elements	30
Table 4.7	Frequently used main structural material	31
Table 4.8	Advantages of reinforced concrete	31
Table 4.9	Disadvantages of reinforced concrete	32
Table 4.10	Experience of respondents on post- tensioned slabs	32
Table 4.11	Advantage of post -tensioned (PT) slab	33

Table 4.12	Disadvantages of post- tensioned slab	34
Table 4.13	Knowledge on cost comparison between conventional reinforced concrete and post- tensioned concrete slabs	35
Table 4.14	Post -tensioned slab viability in Sri Lanka	37
Table 5.1	Cost comparisons in percentage (%)	39
Table 5.2	Unit costs for different panel size in conventional reinforced slab for live load of 1.5 kN/m ²	40
Table 5.3	Unit costs for different panel size in conventional reinforced slab for live load of 2.5 kN/m ²	41
Table 5.4	Unit costs for different panel size in conventional reinforced slab for live load of 5 kN/m ²	41
Table 5.5	Unit costs for different panel sizes in post -tensioned slab for the live load of 1.5 kN/m ²	43
Table 5.6	Unit costs for different panel sizes in post -tensioned slab for the live load of 2.5 kN/m ²	44
Table 5.7	Unit costs for different panel sizes in post -tensioned slab for the live load of 5 kN/m ²	44
Table 5.8	Slab spans and appropriate costs for the conventional RF and post-tensioned slabs for the live load of 1.5 kN/m ²	45
Table 5.9	Slab spans and appropriate costs for the conventional RF and post-tensioned slabs for the live load of 2.5 kN/m ²	45
Table 5.10	Slab spans and appropriate costs for the conventional RF and post-tensioned slabs for the live load of 5 kN/m ²	45



List of Abbreviations

Abbreviation	Description
C1	- Civil 1
CS	- Conventional Slab
CGC	- Centre of Gravity of Concrete
CGS	- Centre of Gravity of Steel
CPD	- Continuous Professional Development
GOSL	- Government of Sri Lanka
LKR	- Sri Lankan Rupees
PT	- Post-Tensioned
RF	- Reinforcement
STP	- Sustainable Township Programme
%	- Percentage
Sq.m	- Square metre



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List of Appendices

Appendix	Description	Page
Appendix A	Sample Questionnaire	53
Appendix B	Conventional Reinforced Slab Design Spread Sheet for 7mx9m Panel for the Live Load of 1.5 kN/m ²	54
Appendix C	Conventional Reinforced Beam Design Spread Sheet for 7m Span for the Live Load of 1.5 kN/m ²	55
Appendix D	Required Quantities of Materials for Conventional Reinforced Slabs and Beams for the Live Load of 1.5 kN/m ²	56
Appendix E	Unit Rate Calculation for Conventional Reinforced Slab and Beams for 21mx27m Area for the Live Load of 1.5 kN/m ²	57
Appendix F	Post-Tensioned Slab Design Spread Sheet for 7mx9m Panel for the Live Load of 1.5 kN/m ²	58
Appendix G	Conventional Reinforced Beam Design Spread Sheet for 7m for the Live Load of 1.5 kN/m ² for the Post-Tensioned Slab	59
Appendix H	Required Quantities of Materials for the Post-Tensioned Slabs and the Conventional Reinforced Beams for the Live load of 1.5 kN/m ²	60
Appendix I	Unit Rate Calculation for Post-Tensioned Slab and Conventional Reinforced Beams for 21mx27m Area for the Live Load of 1.5 kN/m ²	61
Appendix J	Basic Prices for Accessories for the Post-Tensioned Slab	62
Appendix K	Work Study Spread Sheet for Three Multi-Storied Buildings	63