Dedication

To my father who is guiding and supporting me in all of my life

To my lovely mother who taught me the meaning of life

To my Wife for supporting and encouraging me

To my brother and sister

To all those whom I love

To my subject teacher who never failed to teach and guide me

To all my colleagues in the study in the Masters Division in Sudan University of Science and Technology

And most of all to God who gives me strength and good health while doing this

Acknowledgment

Firstly, I deeply thank my God upon completion of this work successfully.

I am very thankful to everyone who all supported me, for I have completed my project effectively.

I would like to express my special thanks of gratitude to my supervisor Dr. Nadir M. Hassanien who gave me the golden opportunity to this wonderful project on the topic of strengthening of reinforced concrete structures. I am really thankful to him.

I am equally grateful to my teacher Eng. Asim ElSanosi & UZ. Mahmoud Ahmed Mohammed Khogali who gave me moral support and guided me in different matters regarding the topic. He had been very kind and patient while suggesting me the outlines of the project and correcting my doubts. I thank him for his overall supports.

I would also like to thank my parents and friends who helped me a lot in finishing this project. Thanking you

I am making this project not only for marks but to also increase my knowledge.

Thanks again to all who helped me .....

ABSTRACT

Errors in planning or construction due to insufficient design dimensions and/or insufficient reinforcing steel or damage to structural parts. This is due to aging of construction materials also Load increases due to higher live loads. The concrete structures must be Strengthen.

This research discusses strengthening of reinforced concrete structures, (Columns, Beams, Foundations and Slabs) for a local building. This building is subjected to failure due to bad construction methods and the difference between the design detailing and the structural section for existing building.

Based on the analysis results the following conclusions had been drawn: The capacity of the footings was checked for adequacy to carry the obtained footing loads under load combination 2 (Service Load). The results show that 30 of the 60 footing in the analyzed part of the building were inadequately sized by more than 30%. After re-designed of the foundations, the Pad Foundation enlarge to Raft foundation to meet the code requirements to make the building safe.

The results after re-design were to increase all the Internal Columns sections 250 x 600mm for (short, ground, first and second floor columns) to column section 550 x 900 with steel reinforcement (4 Ø 20mm + 8 Ø 12mm) by strengthening the columns with concrete jacket to increase the section capacity to carry the load.

And also to increase all the External Columns sections 300 x 600mm for (short, ground, first and second floor columns) to column section 450 x 900mm with steel reinforcement (4Ø20mm+5Ø12mm) by strengthening the columns with concrete jacket to increase the section capacity to carry the load.

The Slabs in the building (case study) were structurally analyzed under ultimate loads (load combination 1) using the three dimensional model. Reinforcement module and the needed reinforcements for the slab section were checked and the results indicate that the slab design for this building is adequate.

المستخلص

الاخطاء في التخطيط اوالتنفيذ بسبب عدم كفاية أبعاد التصميم أو عدم كفاية حديد التسليح أوتدهور بعض الأعضاء اللإنشائية بسبب عدم جودة مواد البناء او التدهور بسبب زيادة الاحمال الحية في المبني, عليه يجب تقوية الهيكل الخرساني.

يهدف هذا البحث مناقشة موضوع تقوية أو تعزيز أعضاء هياكل الخرسانة المسلحة ل (أعمدة, أبيام, أساسات و بلاطات) لمبني تعرض للخطأ اثناء التنفيذ السيء وعدم مطابقة الرسومات التصميمية مع التنفيذ.

وبناءا علي نتائج تحليل المبني تم التوصل الي عدم قدرة الاساسات علي تحمل الاحمال المسلطة عليها واظهرت النتائج ان30من 60 قاعدة بها زيادة في التحميل اكثر من 30%. وبعد اعادة التصميم تم التوصل الي تكبير القواعد الخرسانية الي اساس حصيرة لجعل المبني آمن.

وبعد اعادة تصميم الاعمدة تم زيادة المقاطع الخرسانية للأعمدة الداخلية من 250*600ملم الي 550*600ملم وايضا زيادة حديد التسليح بمعدل

(4 Ø 20mm + 8 Ø 12mm) لزيادة قدرة تحمل الاعمدة الداخلية.

وبعد اعادة تصميم الاعمدة الخارجية تم زيادة المقاطع الخرسانية للاعمدة من 300*600ملم الي 450*600ملم وايضا زيادة حديد التسليح بنفس معدل الاعمدة الداخلية لزيادة قدرة التحمل.

وبعد مراجعة التصميم للبلاطات الخرسانية تحت تاثير الحمل التصميمي الاقصي وجد ان البلاطات ملائمة لتحمل الاحمال الواقعة عليها. وعليه وبعد عمل المعالجات يكون المبني آمنا للاستخدام.

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B.C	Allowable bearing capacity
f_{cu}	Characteristic strength of concrete
f_y	Characteristic strength of reinforcement
K	Effective length factor for a compression member
l_a	lever arm factor = z/d
Nx	Axial load subject to member
Mx	Bending moment in x-x axis of member
My	Bending moment in y-y axis of member
Mz	Bending moment in z-z axis of member
Qy	Shear force in y-y direction
Qz	Shear force in z-z direction
Pu	Ultimate design load
Rz	Axial reaction at footing
Rx	Horizontal reaction in x-x axis at footing
Ry	Horizontal reaction in y-y axis at footing
Rxx	Bending moment force at footing level in axis x-x
Ryy	Bending moment force at footing level in axis y-y
v	Longitudinal shear per unit length