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.

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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

الإخطاء في التخطيط أو التنفيذ بسبب عدم كفاية أبعاد التصميم أو عدم كفاية حديد التسليح أو تدهور بعض الأعضاء الإنشائية بسبب عدم جودة مواد البناء أو التدهور بسبب زيادة الاموال الحية في المبنى، عليه يجب تقوية الهيكل الخرساني.

يهدف هذا البحث مناقشة موضوع تقوية أو تعزيز أعضاء هيئات الخرسانة المسلحة ل(أعمدة، أعمدة، أساسات و بلاطات) لمبنى تعرض للخطأ أثناء التنفيذ السيء، وعدم مطابقة الرسومات التصميمية مع التنفيذ.

وبناءاً على نتائج تحليل المبنى تم التوصل إلى عدم قدرة الأساسات على تحمل الاموال المسلطة عليها وأظهرت النتائج ان 30% من 60 قاعدة بها زيادة في التحميل أكثر من 30%. وبعد إعادة التصميم تم التوصل الى اكتمال القواعد الخرسانية التي اساس حصيرة لجعل المبنى آمن.

وبعد إعادة تصميم الأعمدة تم زيادة المقاطع الخرسانية للأعمدة الداخلية من 250*600مم الي 550*650مم وياضا زيادة حديد التسليح بملع (4 Ø 20mm + 8 Ø 12mm)

وبعد إعادة تصميم الأعمدة الخارجية تم زيادة المقاطع الخرسانية للأعمدة من 300*600مم الي 450*600مم وياضا زيادة حديد التسليح بنفس معدل الاموال الداخلية لزيادة قدرة التحمل.

وبعد مراجعة التصميم للبلاطات الخرسانية تحت تأثير الحمل التصميمي الأقصي وجد أن البلاطات ملائمة لتحمل الاموال الواقعة عليها. وعلى وبعد عمل المعالجات يكون المبنى آمناً للاستخدام.
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<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>B.C</td>
<td>Allowable bearing capacity</td>
</tr>
<tr>
<td>$f_{cu}$</td>
<td>Characteristic strength of concrete</td>
</tr>
<tr>
<td>$f_y$</td>
<td>Characteristic strength of reinforcement</td>
</tr>
<tr>
<td>K</td>
<td>Effective length factor for a compression member</td>
</tr>
<tr>
<td>$l_a$</td>
<td>lever arm factor = $z/d$</td>
</tr>
<tr>
<td>$N_x$</td>
<td>Axial load subject to member</td>
</tr>
<tr>
<td>$M_x$</td>
<td>Bending moment in $x$-$x$ axis of member</td>
</tr>
<tr>
<td>$M_y$</td>
<td>Bending moment in $y$-$y$ axis of member</td>
</tr>
<tr>
<td>$M_z$</td>
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<td>$P_u$</td>
<td>Ultimate design load</td>
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<tr>
<td>$R_y$</td>
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<tr>
<td>$R_{yy}$</td>
<td>Bending moment force at footing level in axis $y$-$y$</td>
</tr>
<tr>
<td>$v$</td>
<td>Longitudinal shear per unit length</td>
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