

UNIVERSITI TEKNOLOGI MARA

**ECS 358
CIVIL ENGINEERING DESIGN PROJECT**

**REINFORCED CONCRETE BUILDING
DESIGN PROJECT**

**PROJECT BASED LEARNING
(CASE STUDY)**

**NIK NURUL RASYIQAH BINTI NIK MOHD
RAFIZA**

DIPLOMA

FEBRUARY 2021

ACKNOWLEDGEMENT

First of all, praises and thanks to Allah SWT for His showers of blessing throughout my completing process of final year project (FYP). I would like to say thanks for my friends, lecturer, the other lectures and my family because they have given a lot of motivation, support and guidance to finish my final year project (FYP). It was very challenging to finish the final year project because of the online learning so that, everything that wants to learn must learn through google meet, WhatsApp, video and google classroom.

First, I want to thank my lecturer for this course which is Sir Idzwan Yusuf because he was teaching our class successfully, guide, and gave supported to our classes to finish the final year project (FYP). He excellently gave a lecture for our class through google meet. Without his support and guidance, this project would not have been possible.

I also want to say thanks to other lecturers which were Sir Firdaus and Madan Nadiah because they also help to record their video for their classes and then shared to the other students for guided especially. Without them, I also cannot know and learn about this subject. Besides, I am deeply grateful and thank full because getting the good classmate. We were learn everything and do this subject together through google meet and also guide the other friends they have any problem to finish the project. It was meaningful. Next, I also thankful for my parents because they also gave their support and motivation to finish the project.

Last but not least, they were many things that I can learn in this subject especially when calculating and design every of the structure. If I was wrong design the structure and the structure was got crack in the calculation, I must redesign again and calculate again. It was the sad things that I have had for the subject but because of that I can learn and improve the knowledge about that structure for the future.

Thanks for all encouragement, support and guide!

The task for this project was to find the one architectural building which was double-storey houses or any building double storey. It was include of the floor plan of the ground floor until the roof, the section of the house and the elevation of the house. The SI report also must find to calculate the bearing capacity of the soil at the place. So there was the step that was done which are:

Firstly, after got the architectural drawing, the key plan of the building was sketched and draw in the software AutoCAD. Every of the specification, the place of the brick wall, the column, the slab, water tank and also garage watch draw and show in that key plan layout.

After that, proceed with calculate the permanent and variable load for that building from ground floor until roof and design the slab. So the one slab that big, and have variable load big was chosen and design. The slab was calculated from load to detailing. All of it was calculated in the design sheet. The detailing also has been drawn in the software AutoCAD.

Next, the simply supported beam was chosen at the ground floor. The beam was chosen because it was the critical simply supported beam. The beam that chose had point load so that both of the beams which were main and secondary beam has been designed and also calculate from load until detailing on the software AutoCAD. The taking off and the bill of quantities of the beam also calculated. Then proceed to the continuous beam which was located at the ground floor. The beam has 7 spans. Every each of the span must calculate the load. For the design, the critical span of that has got a higher moment at support and midspan was choose and calculated. For detailing all of the spans have been also drawn in software AutoCAD.

Moreover, the next step was calculated and design the column. So, one of the columns was chosen and must be designed until the crack check and also draw the detailing. But to design the column, the bearing capacity was known and must be calculated. So that, the bearing capacity was getting and calculated in the excel and using a formula that was learned in soil engineering. The value that was get was from the Mackintosh Probe Test that has got from the SI report. The detailing also has been a draw in the AutoCAD.

After finishing the column, the pad footing was chosen and design. The step of design also from the load that was got from column until detailing in software AutoCAD. The last was to

3.1. Summary of design works

From this design work, it can summarize that there have slight differences between manual calculation and PROKON calculation. This is because the manual calculation using a different formula based on appendix and it based on Eurocode 2. While, compared with PROKON calculation, it used varies formula based on Eurocode 2 and BS. That way both of it got the different value than manual calculation.

Moreover, the manual calculation it was taken a long time to calculate because if the structure was deflected it must redesign again with the new parameters. But, for PROKON calculation, it will easily to used and it will give more accurate result in term of calculation but requires correct data input from a human. This is because the PROKON calculation can be got from generating the input for those structures. So there will be no wrong calculation in terms of formula or digit number. If there are wrong maybe because of human capability.

In conclusion, the PROKON calculation can help the engineer in future or now to solve and design their building. This is because they can easily estimate and get good data from that software than manual calculation.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	1
1. PROJECT 1 – REINFORCED CONCRETE BUILDING DESIGN PROJECT	4
1.1. Introduction.....	5
1.1.1. Requirements of building – by – law, fire safety regulations.....	8
1.1.2. Architecture drawings of the building with TITLE BLOCK	12
1.1.3. Project background / details	16
1.1.4. Design Parameters (Materials strength / grades)	17
1.1.5. Weights of materials used in the building (list of Gk and Qk for slab panels and construction materials)	23
1.2. Project Schedule.....	27
1.2.1. List of activities and time frame	29
1.2.2. Project schedule using Microsoft Project	39
1.3. Design of Structural Elements (Manual Design)	89
1.3.1. Structural Key Plans of the building with TITLE BLOCK	91
1.3.2. Slab design calculations and detailing (AutocAD).....	94
1.3.3. Simply supported & continuous beam design calculations and detailing (AutoCAD)	104
1.3.4. Column design calculations and detailing (AutoCAD).....	141
1.3.5. Pad footing design calculations and detailing (AutoCAD)	166
1.3.6. Staircase design calculations and detailing (AutoCAD)	182
1.4. Design of Structural Elements (Software Design).....	191
1.4.1. Slab design (input and output).....	192
1.4.2. Simply supported & continuous beam (input and output).....	204
1.4.3. Column design (input and output)	221