



اَوْنَبُوْرَسِيْتِيْ بِاِتِيْكَوْلُوْكِىْ مَارَا
UNIVERSITI
TEKNOLOGI
MARA

**ECS 358
CIVIL ENGINEERING DESIGN PROJECT**

**REINFORCED CONCRETE BUILDING
DESIGN PROJECT
&
PROJECT BASED LEARNING
(CASE STUDY)**

NUR BALQIS QURRATU'AIN BINTI AZAHARI

**DIPLOMA
FEBRUARY 2022**

ACKNOWLEDGEMENT

Assalamualaikum and good day, in today's contemporary world, technology and the economy have steadily progressed, resulting in a transformation in how industry and building projects function. A computer is capable of solving a certain equation with the aid of computer software. Currently, the project functions as a connection between academic research and hands-on experience. With this assignment, I gained experience in both manual and software computation, and I was able to complete the job within the time range that was set. And for this opportunity, I'd want to express my gratitude to Allah (SWT) for providing me with the power and capacity to perform the tasks assigned to us for this topic. This undertaking would not have been possible if it had not been for Allah favour.

Following that, I'd want to express my thanks to my parents, to whom I will be eternally thankful for everything they have done for me. They are always there for me, offering support and encouragement when I feel as if I am trapped in a bottomless hole with no way out. They are the ones that help me get back on my feet so that I may keep pushing forward until I reach my destination. This was especially true during the Covid-19 outbreak when all pupils received their education through E-learning. I'd like to take this opportunity to offer my deepest thanks to Sir Mohammad Hazizi Bin Jamal, my Design Project lecturer, for his guidance and support during the course. He also spent her spare time educating us about Prokon and aiding me and my friends in utilizing the software during the E-learning and studio coaching sessions. It provides me with valuable ideas that will help me do better on my project.

Aside from that, I'd want to express my gratitude to Miss Narita Binti Noh, my Structural Reinforced Concrete and Steel Design professor, who guided me through the whole course from beginning to end. I would not have been able to complete my assignment for this semester without their assistance. In closing, I would like to thank the other lecturers, staff members, students, and friends who have provided me with guidance and assistance when I have been unsure about various aspects of this topic during the semester in order to fulfil all of the requirements necessary in this subject. I have no meaningful words to convey my gratitude other than "thank you very much," and my heart is still overflowing with gratitude for the kindness shown to me by everyone. Please accept our gratitude on behalf of everyone who has offered their time and talents to assist us. I truly appreciate everything what've they done.

Table of Contents

1. PROJECT 1 – REINFORCED CONCRETE BUILDING DESIGN PROJECT

1.1 Introduction

1.1.1	Requirement of building – by – law, fire safety regulations.....	4
1.1.2	Architecture drawings of the building.....	6
1.1.3	Project background	12
1.1.4	Design parameters for every element.....	14
1.1.5	Weight of materials used in the building.....	19

1.2 Project Schedule

1.2.1	List of activities and time frame.....	24
1.2.2	Project schedule using Microsoft Project	35

1.3 Design of Structural Elements (Manual)

1.3.1	Structural Key Plans of The Building	59
1.3.2	Slab design calculations and detailing (AutoCAD)	63
1.3.3	Simply supported & continuous beam design calculations and detailing (AutoCAD)	73
1.3.4	Column design calculations and detailing (AutoCAD)	96
1.3.5	Soil bearing capacity and footing size estimation.....	112
1.3.6	Pad footing design calculations and detailing (AutoCAD).....	119
1.3.7	Staircase design calculations and detailing (AutoCAD).....	126

1.4 Design of Structural Elements (Prokon)

1.4.1	Slab design (input & output).....	134
1.4.2	Simply supported & continuous beam design (input & output)	151
1.4.3	Column design (input & output)	194
1.4.4	Pad footing design (input & output)	208
1.4.5	Summary comparison and justification between manual calculation and design software.....	224

1.1.1 Requirement of building – by – law , fire safety regulations

In this world, it is normal for us to have laws. Every action we take is governed by a set of rules. For example, when driving on the road, there is a speed restriction that must be followed for the driver's safety and the safety of others. As a result, the same is true for any building in which we live. The Uniform Building By-Law of 1984 imposes requirements on all construction parts (UBBL). We employ this regulation to ensure public safety and environmental protection, as well as to standardize all building activity. As a result, progress on the job site will be much easier. Hence will make work progression at the site much more accessible. Thus, this reinforced concrete double-storey house design project must follow the UBBL and fire safety regulations so that the people who live in any buildings feel safe and comfortable.

As a result, based on the UBBL standard value, the characteristics of this house project are as follows: first, the width of every livable room in a residential house shall not be less than 2 metres (UBBL, Section 42 paragraph 2). Another relevant component is the kitchen's space and width being less than 4.5 square metres and 1.5 metres, respectively. Furthermore, in Section 43(d), UBBL stated that a bathroom with closet fittings must be at least 2 metres long and 0.75 metres wide. In every double-storey terrace house, there must be a party wall that is a dividing partition between two adjoining buildings that the occupants of each residence share. UBBL stated in Section 86(3) that all party walls should be carried above the upper surface of the roof to a distance of not less than 200 millimetres at right angles to such an upper surface.

For fire safety regulation, in section 165(3), the travel distance from any point in the room to the room door does not exceed 15 meters. Section 227, portable extinguishers shall be provided in each building under the code of practice. These are some examples taken from UBBL 1984, where engineers need to comply with the law to construct a standardized building.

3.1 Summary of Design work

Civil engineering programs rely on Standards and Codes of Practice to help them through the process of fulfilling their design and workmanship responsibilities. Essentially, standards or practice standards serve as a formalised representation of the accumulated knowledge and technical competence that has accrued over time in the building and construction business. We must have a thorough understanding of concrete in order to construct reinforced concrete that is not as simple as we had anticipated.

As we all know, concrete is the most often used building material, second only to steel. As a result, it is critical to design reinforced concrete in accordance with the Code of Practice. In addition, all construction purposes must adhere to the Malaysian Standard Eurocode Code of Practice, which is available online. In addition, we must abide by the Uniform Building By Law, which is a federal statute. If we did not adhere to the legislation, our project could be negatively impacted in terms of cost, timeliness, and other factors. Furthermore, designing reinforced concrete is critical since we want to produce a structure that will be used by the customer.

To put it another way, we as designers must create carefully in order to avoid causing damage or accident to the customer. As civil engineers, it is our responsibility to design all elements in such a way that they can survive any dangerous situation, such as an earthquake, flash flood, severe wind, and so on.

Each element of the building must be manually calculated, including the slab, beam, column, pad footing, and staircase. Each section's calculations must be submitted to the lecturer. In other words, they cannot go to the column if they fail to calculate the beam manually. Students have a lot of time during class to refer to their calculations, thus all efforts are on the students. Students must use reputable manuals, codes, standards, and data publications to gather data. Then use the formula to calculate the size of steel bars, bearing wall thickness, concrete, etc. Manual has the issue that various experts may come to different conclusions

For diploma level, we only need to design static buildings in which the wind motion is not taken into consideration throughout the design process. Because of this, we need to have a fundamental understanding of the subject as civil engineering students. The use of an uniform Code of Practice will ensure that all aspects of the construction are standardised