UNIVERSITI TEKNOLOGI MARA

ECS 358
CIVIL ENGINEERING DESIGN PROJECT

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

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DIPLOMA

FEBRUARY 2021

1.1. Introduction

The structural design is a methodological investigation of the stability, strength and rigidity of the structures. The basic importance of structural analysis and design is to create a structure capable of resisting all applied load without failure during planned existence. A highly specialize field of civil engineering is structural design. It can be defined as a set of methods or instruments used to evaluate a structure's safe and cost-effective requirements and to ensure that the designed structure is sufficiently strong to support its intended load. In order to decide what internal and external forces will affect the structure, structural engineers perform a structural study, then construct a structure with the necessary materials and reinforcements to satisfy the requirements.

Under subject ECS358, we required to design a double storey house structure individually. With the guidance from our lecturer which is sir Ahmad Izwan bin Yusuf, I would like to giving a big thankful to him because with his teaching and advice, we could manage to survive and help us through out this individual Final Year Project. In this project, the structure elements that have been designed are slab, simply supported beam, continuous beam, column, pad footing and staircase. The project will be done individually. Therefore double storey bungalow will be chosen. First thing that have to do is we need to have a project schedule by using the Microsoft project. The task is to do a planning by listing the task, date beginning and the end of the project, the predecessor, resource sheet and also the cost of the entire project. Second thing that have to be done was to draw a structural key plan of all floor which is ground floor, first floor and roof floor. Then, for each of the elements of structure that have been listed above need to be design by calculating the moment and shear force of the elements to make sure that the structure that have been design are strong in tension load, bending and also from deflection and cracking according to the design appendix. After that, by using software such as Prokon, the input are obtained from the manual calculation, therefore the comparison from manual calculation and esteem will be justified. After we obtained all of the calculation and information, we need to estimate the cost of materials and works by doing the taking off and bill of quantities for each of the elements.

1.1.1 Requirements of Building-by-law

Building-by-law (UBBL) is prescriptive building code. The objective of the UBBL are to set up standardized building regulations for the whole of Malaysia and applicable to all local authorities and building professionals, to clarify the legal obligations of the Principal Submitting Person for buildings with simple descriptions, regulate the building's architectural, structural, health & safety, fire protection capabilities and construction requirements; explicitly refer to the accepted standards and accelerate the processing and design permits and occupancy of buildings.

For the requirement building by law and safety regulations (UBBL) for this building are the spacing of the residential building must not less than one-third of the build area of the building lot, every room designed, adapted or used for residential shall be provided with natural lighting and natural ventilation by means that there will be one or more windows having a total area of not less than 15 of clear floor area of such room and shall have openings capable for air to pass in the building. Other than that, every water-closet, urinal or bathroom shall be provided with natural lighting and ventilation of one or more windows not less than 0.2 of total area, the minimum size of each air-well to be provided for 2 storey in height is seven (7) square meters. The height of the rooms in residential buildings for living room and bedrooms are not less than 2.5 meters, for kitchen not less than 2.25 meters and for bathroom, water-closets, porches, balconies and garages are less than 2 meters. In part five (V) in terms of structural requirements, the bungalow project will be use any materials or method of mixing or preparing materials or applying which conforms with a Standard Specification or Code of Practice prescribing the quality of material or standards of workmanships requirements.

For the fire safety regulations, there supposed to be. In UBBL 113, 157, it is inferred from the UBBL that all components that form the Exit Route shall be of protected construction. Using the same inference, protected shall mean enclosed, separated or isolated from untenable exposure to fire or smoke. Also in UBBL 2012, All party walls shall generally be of not less than 200 millimeters total thickness of solid masonry or insitu concrete which may be made up of two separate skins each of not less than 100 millimeters thickness if constructed at different times. By compartmentations by height, in UBBL 2012 (137), In any building exceeding 30 meters in height, all floors shall be constructed as compartment floors, other than a compartment which is within a residential maisonette which may comprise two storey levels.

1.1.3. Project background

Design project in civil engineering is about construct, maintain and improve the physical environment, including building bridges, tunnels, roads, railways, canals, dams, buildings, flood and coastal defences, airports and other large structures. For this project, it requires to build or design structures in a double storey houses.

The building that have been chosen is double storey bungalow with five (5) bedrooms, dining room, kitchen and wash area, three (3) bathroom and a living room also family hall for gatherings. This project is located at lot 41992, Jalan Melati 3 Kampung Sungai Kajang, Seksyen 9, Selangor Darul Ehsan. The architect name of this project is Bakhri and the engineer is IR Azman Bin Teh. The company that have been given the project to build this two storey bungalow is Perunding Trussmaju which is the company is located at 8-2B, Jalan Boling Padang, E13/E, Seksyen 13, 40100, Shah Alam, Selangor. The client name was En. Azhan.

The objective of designing the structural of this bungalow is because to know the suitable budget to start the project, an accurate timetable, and a clearly specified design plan. This helps to ensure that the ideas are successfully converted into an outstanding finished product. Another objective is to make a better planning for the construction project so that the project will execute successfully.

3.1. Summary of design works

The building construction is the process of adding structure to real property. The majority of building construction projects are building high rise building, small building like houses, mosque etc. also it involved with small renovations such as addition of a room and so on. Therefore the design for its structure also important to build the construction building.

A design is a plan or specification in the form of a prototype, product or method for the creation of an object or system or for the execution of an operation or process, or the outcome of that plan or specification. Its a methodological investigation of the stability, strength and rigidity of the structures. In structural analysis and design, the fundamental objective is to create a structure capable of resisting all applied loads throughout its planned existence without failure. Transmitting or supporting loads is the primary function of a structure. The design has to follow certain objectives and constraints, may take aesthetic, practical, economic, or socio-political considerations into account, and is required to communicate with a certain environment. If the actual loads applied exceed the design specifications, the device will likely fail to perform its intended function, with possible serious consequences. A well-designed structure greatly minimizes the possibility of costly failures.