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CIVIL ENGINEERING DESIGN PROJECT

TECHNICAL REPORT

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1.1.1 REQUIREMENT OF BUILDING LAW, FIRE SAFETY REGULATIONS

Every construction project that entailed the creation of a large structure or any building services should and must adhere to the country's standard requirements. Malaysia has designated the local government's function as the primary planning body for the building regulation system. To ensure that all buildings and megastructures are built in accordance with the stated standards and guidelines, the the "Uniform Building by Law 1984" (UBBL 1984) have been put into effect.

The Uniform Building by Law of 1984, or UBBL 1984 for short, is one of Malaysia's standard building codes of practises that has been published in the Gazette to standardise the processes for construction planning, building approvals, and building occupants as well as for the amendment of fire safety regulations. The UBBL provides guidelines on the minimal standards for the management and construction of streets, drainage systems, and buildings within the purview of local authorities. The building code is broken down into nine sections that address the preliminary stage, the submission of plans and drawings for approval, space lighting and ventilation, structural requirements, procedures for temporary construction, and fire safety requirements like fire alarms, fire detection, fire extinguishing, and fire access.

According to the UBBL 1984, the fire safety regulation will be highlighted at the start of each element of calculation in this project. According to MS EN 1990, in any case of fire, the structural resistance must be enough for the necessary amount of time. One of the most crucial part in UBBL is fire safety regulations since they run the danger of having a significant influence on community life, buildings, businesses, the environment, and surroundings.

Every structural element, including beams, slabs, pad footings, columnnses, should have nominal cover or concrete cover. To get nominal cover, engineer need to calculated using the standard fire resistance specified by UBBL in 1984. Concrete cover act as safe separation between the nearest surface of reinforcement and the nearest concrete surface. The highest value from the exposure situation and fire resistance will be used to determine the value of nominal cover.

3.1 SUMMARY OF DESIGN WORK

Overall, this project consists of basic flow in designing a double-storey terrace house. Based on the example from the architectural drawing, a structural key plan will be drawn by using the AutoCAD software which includes the plan view of ground floor, first floor, and roof floor layout. By looking at the structural key plan, we can observe that the column will be located at each part where the beams are connected in two directions to ease the manual calculation. The slabs are also labelled according to its types, in which there are one way and two-way slab. Usually, an additional note will be added at the bottom or top of the structural key plan to make sure the drawings can be read and understand easily by others.

Based on this project, I can acknowledge that it is important to follow the proper format and guideline to make sure the design meets the standard requirement which set by the local authorities. For example, the requirement of UBBL 1984 and fire safety regulations stressed about the important of nominal cover and minimum value for building against fire resistance. For the calculation part, calculation is conducted based on the types of load transfer and the analysis of loading at the selected critical part of the structural elements such as slabs, beams, column, pad footing and staircase. In design phase for the structural elements, the calculation is made based on the Eurocode 2. The dimension proposed for each element is obtained from the preliminary sizing. The calculation part is divided into two, which consists of manual calculation and software output by using PROKON. Both calculations are needed as the result from the calculation will be compare at the end of the project with the objective to identify if there's any errors that occurs in manual calculation so that the design for all structural elements is adequate to transfer the load safely. \

From the manual calculation and software output that has been calculated, the proposed dimension which used for the calculation can be finalized for selection of construction materials and information regarding the main reinforcement, shear, cracking, and deflection has pass the design phase. This process is essential to make sure the calculation is right, then the next process can be executed, and load can be transfer safely toward all the parts of the building. In addition, the detailing for each element has been drawn complete with the main reinforcement and link required or used, so that human error in calculation can be avoided.

3.3 RECOMMENDATION / REFLECTION

From the beginning until the end of this project, I had managed to gain so much new knowledge regarding the construction industry, especially in designing a double-storey house. From both manual calculation and software output, I can say that both ways have shown many differences in term of formula for the calculation and error itself. The increment in percentage difference shows that human error may occur, as the calculation for every stage are quite long and a bit complicated as there's a few that related with each element. So, both methodologies need to be done in design phase so that analysis process can be done, and comparison can be made to minimize the percentage difference.

Lastly, I can say that PROKON's software are recommended to be used in design phase as we live in the era where the technologies are advanced rapidly, the construction industry can fully utilize the convenience. Plus, PROKON's software also are widely use in other countries as it provides varies code of practices, according to the user's country or preferences, including Malaysia. The code of practice also can be used as a comparison for the calculation.