

CHAPTER 1

PRELIMINARY



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1.1 BACKGROUND

Education is the learning of the knowledge, skills, and habits of a group of people passed down from one generation to the next through teaching, training, or research. Based on article 1 paragraph 2 of the Law of the Republic of Indonesia No. 12 of 2012 concerning higher education (Indonesia) “Higher Education is a level of education after secondary education that includes diploma programs, undergraduate programs, master programs, doctoral programs, and professional programs, as well as specialist programs, organized by universities based on the culture of the Indonesian nation”.

Higher Education is an institution that provides education and teaching above middle-level universities based on Indonesian national culture and in a scientific way. Based on Indonesian statistics in 2022, there are 3,115 universities spread throughout the archipelago. One of them in West Java is ± 392 universities which are divided into public and private universities.

Cirebon City is one of the cities in the province of West Java which is very strategically located. This can be seen from the development of the economic sector, tourism sector or the education sector which is increasing. Especially the education sector, in Cirebon City there are quite a lot of universities, be it state universities, private universities, colleges, polytechnics or academies. One of the well-known private universities in Cirebon is The University of Swadaya Gunung Jati Cirebon. Swadaya Gunung Jati Cirebon University itself has been registered as one of the universities of choice for the Merdeka Campus program which is the latest program of the Ministry of Research Technology and Higher Education (Kemenristekdikti).

Where one of these programs is an independent student exchange. Where in this program students will take lectures at other campuses according to their choice. For this reason, campuses that are partners of independent campuses must maximize all facilities and infrastructure so that when students exchange participants can learn optimally. Universitas Swadaya Gunung Jati also added 2 new study programs at the Faculty of Engineering, namely the Electrical Engineering Study Program and the Urban Regional Planning Study Program. One of the vital infrastructures is the existence of a laboratory.

According to Emha (2002), a laboratory is defined as a place to conduct experiments, investigations, and so on related to physical, chemical, and biological sciences or other fields of science. The laboratory is a place where students practice understanding concepts through experimentation and observation so that their existence is required so that students get direct experience in applying theories that are discussed during lectures in class, through practicum activities. Therefore, it is very important for a university to provide an adequate laboratory and meet the standards as a student experiment center.

Based on its function, the first laboratory becomes a place for teaching lecturers to explore concepts, develop learning methods, enrich knowledge and skills, and so on. Second, as a place for students to learn, understand, develop skills, and apply the theory that has been obtained through lecture activities in the classroom. The course on construction material technology and soil research is one of the compulsory courses in the civil engineering study program of Swadaya Gunung Jati Cirebon University. This soil investigation practice course aims to enable students to be able to test soil such as content weight and moisture content tests, soil specific gravity tests, hydrometer tests, atterberg boundary tests, compaction, and so on.

However, when conducting testing, there are not a few obstacles that arise so that it can reduce the effectiveness of the test.

In addition to the unavailability of adequate tools, the most significant obstacle is the unavailability of sufficient laboratory space to support practicum activities compared to the large number of practicum participants. Limited space results in limited implementation of practicum that can be carried out. Therefore, it is necessary to build an adequate practicum building so that other practicums can be carried out so that students can further develop their understanding during lectures in class through practicum activities in the laboratory.

In the construction of buildings, there is an analysis of structures that are used as a way or system to achieve the construction as planned. With the rapid development of science and technology (IPTEK), structural analysis can be assisted by the help of SAP2000, ETABS, HEC-RAS, Plaxis and so on applications. In this planning, what is used is structural analysis with the help of ETABS software.

In planning a multi-storey building structure, it must meet the criteria of safety and excellent service. Therefore, a building plan must meet the applicable SNI so that the results are as planned. Among the SNI used in planning the Gunung Jati Swadaya University Laboratory Building are:

- SNI 2847 – 2019 Structural concrete requirements for buildings.
- SNI 1726 – 2019 Earthquake resistance planning procedures for building and non-building structures.

The two SNI are the latest SNI that have been ratified by the National Standardization Agency and will begin to be effectively enforced in February 2022. In a sense, after February 2022, all buildings must be designed in accordance with SNI 2847:2019 and SNI 1726:2019.

1.2 PROBLEM FOCUS

In this thesis, the main focus is to design and analyze the construction of the 6-story building of the Laboratory of Swadaya Gunung Jati Cirebon University, in the process requires guidelines in its design using reference to the Indonesian National Standard Regulations:

- SNI 1727 – 2020 Minimum load of building planning.
- SNI 2847 – 2019 Structural concrete requirements for buildings.
- SNI 1726 – 2019 Earthquake resistance planning procedures for buildings and non-building structures.

1.3 FORMULATION AND IDENTIFICATION OF THE PROBLEM

1.3.1 Problem Formulation

The formulation of problems in this study includes:

1. How to design the structure of a Laboratory building construction of Swadaya Gunung Jati Cirebon University using concrete structures?
2. How to plan the dimensions of the structure and analyze the construction structure?
3. How to implement the results of the analysis and calculation of structural planning in the drawing plan?
4. How to calculate the structural budget plan (RAB) for construction?

1.3.2 Problem Identification

Identification of problems in this study is focused on designing and analyzing the structure of the Laboratory Building of Universitas Swadaya Gunung Jati Cirebon, whether the structure is safe and in accordance with SNI or not.

1.4 SCOPE OF PROBLEM

The thesis with the title "**ANALYSIS AND DESIGN THE STRUCTURE OF A LABORATORY OF SWADAYA GUNUNG JATI CIREBON UNIVERSITY**" will explain the problem in the field of study, so it is necessary to find a solution to the problem. Therefore, it is necessary to limit the issues raised as follows:

1. Planning and analyzing the concrete structure of the laboratory building of Swadaya Gunung Jati Cirebon University 6 floors in accordance with SNI 2847:2019 for Reinforced Concrete, SNI 1726:2019 for Earthquake Resistance Planning for Building Structures and SNI 1727:2020 for Loading.
2. Calculate the earthquake force that occurs in the building structure.
3. Plan the dimensions of the floor plate, beams, columns, and foundation using reinforced concrete structures.
4. Do not design stair, shear walls, or retaining walls.
5. Analyze building structures of columns, beams, slabs, and foundation.
6. Not planning the installation of Mechanical Electrical and Plumbing (MEP).
7. Not planning the installation of Sanitation and Ceiling.
8. Visualizing 2D and 3D.
9. Calculating the Budget Plan (RAB) on the structure.

1.5 PURPOSE AND OBJECTIVES OF THE STUDY

1.5.1 Research Purpose

The purpose of thesis with the title "**ANALYSIS AND DESIGN THE STRUCTURE OF A LABORATORY OF SWADAYA GUNUNG JATI CIREBON UNIVERSITY**" will explain the planning and construction of a 6-story laboratory building using reinforced and earthquake-resistant concrete structure construction.

1.5.2 Research Objectives

The objectives of this study are:

1. Design a new laboratory building for Swadaya Gunung Jati Cirebon University which is more organized and in accordance with Indonesian national standards.
2. To find out the details of the appropriate dimensions, columns, beams, floor plates and foundations.
3. Knowing how to implement the results of the analysis and calculation of structural planning in the drawings of the plan.
4. Knowing how to calculate the budget plan (RAB) of the planned building structure.

1.6 USABILITY OF THE STUDY

1.6.1 Theoretical Uses

The theoretical uses of this study include

- To apply the knowledge of civil engineering that has been obtained during the lecture period as a provision for the world of work.
- The results of this study are expected to be used as input for academic studies which are additional knowledge, especially in planning the construction of high-rise buildings based on the assessment of civil engineering practitioners and academics.

1.6.2 Practical Uses

Practical uses in this study include:

- It can be used as a comparison of pre-existing planning analysis with the planning analysis discussed in this study, so that it can be used as a reference for technicians or practitioners in designing a building, especially the construction of high-rise buildings.

- The results of this study are expected to provide input for universities as an effort to develop the construction of lecture support facilities, namely laboratories at Swadaya Gunung Jati University Cirebon which are useful for the benefit of student education.