

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Bridge is a structure build over a river, road or railway as over pass to allow people and vehicles to cross from one side to the other. Other definition of the bridge is a structure build to span physical obstacles without closing the way underneath such as a body of water, valley or road, for the purpose of providing passage over the obstacle. There are many different designs that each design serve a particular purpose and apply to different situations. Design of bridges very depending on the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it [1].

The first bridges made by humans were probably spans of cut wooden logs or planks and eventually stones, using a simple support and crossbeam arrangement. A common form of lashing sticks, logs, and deciduous branches together involved the use of long reeds or other harvested fibers woven together to form a huge rope capable of binding and holding together the materials used in early bridges [1].

The bridge is one of the facilities in a system of the road network. There are some sort of kind of bridge commonly used. Including for a bridges by short landscape usually use construction truss simple, bridges reinforced concrete and others. But to complete the constructions of long landscapes of are mostly used two types of the cable stay bridge and suspension bridge. Cable stayed bridge are the bridge with the system static structure indeterminate high degree , in which forces working influenced by

stiffness of main bridge supporting components, that is the system the floor vehicle ( plates , a longitudinal beam , and beams transverse ) together with a cord and the main tower. [4]

Cable stayed bridges rely on high strength steel cable as major structural element. The stay cable are inclined from the supporting towers to edge girders at or below the deck elevation. These bridges are generally signature structures with excellent aesthetic characterized by very slender superstructures and tall towers [3].

The first modern cable-stayed bridge was the Stromsmund Bridge in Sweden constructed by the firm Demag, with the assistance of the German engineer Dischinger, in 1955. At the same time Leonhardt designed the Theodor Heuss Bridge across the Rhine at Dusseldorf but this bridge, also known as the North Bridge, was not constructed until 1958. [5]. As era development, it has undergone many modification cable bridge stayed until they reached that is the one that most efficient. While in Indonesia, bridges cable stayed commenced in 1998 in Kepulauan Riau. After that other bridge were also built in several place:

Table 1.1 Cable Stayed Bridge in Indonesia

Name of Bridge	Location	Main Span (m)	Total Length (m)	Years Built
Tengku Fisabilillah	Kep. Riau	350	642	1998
Pasupati	Jawa Barat	106	2282	2005
Grand Wisata Overpass	Jawa Barat	81	81	2007
Siak Indrapura	Riau	200	1196	2007
Suramadu	Jawa Timur	434	5438	2009
Melak	Kalimantan Barat	340	680	2015
Galalapoka	Maluku	150	1065	2015
Sukarno	Sulawesi Utara	120	622	2015
Siak IV	Riau	156	699	Under Construction

## **1.2 Problem Statement**

From the above explanation, knowledge to design bridge is very important for civil engineering student. The problem that knowledge of design bridge implicitly is not given in Civil Engineering Programme Faculty of Engineering UNISUULA. There is no special lecture about bridge design at present. Therefore, design of bridge is taken as the topic of final assignment before graduating as civil engineer. In this final assignment, design of cable stayed bridge will taken.

## **1.3 The Objective of the Design**

From the above background and problem statement, the objectives of this final assignment can be mentioned as follows:

1. To design and calculate cable stayed bridge,
2. To apply the basic theory of cable stayed bridge structure.

## **1.4 Scope of the Study**

To accomplish those objectives, this study started with a literature review of the information pertaining to design and calculation of Cable Stayed Bridge. All books, journals, papers pertaining of Cable Stayed Bridge design and calculation will be reviewed. Literature review and then will be followed by methodology. In the chapter of methodology, dimension of pylon, cable, anchor will be determined. Bridge structure calculation will be given in chapter 4, while the results will be given and discuss in chapter five.