

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

Rail transport is a means of transferring of passengers and goods on wheeled vehicles running on rails, also known as tracks. It is also commonly referred to as train transport. In contrast to road transport, where vehicles run on a prepared flat surface, rail vehicles (rolling stock) are directionally guided by the tracks on which they run. Tracks usually consist of steel rails, installed on ties (sleepers) and ballast, on which the rolling stock, usually fitted with metal wheels, moves. Other variations are also possible, such as slab track, where the rails are fastened to a concrete foundation resting on a prepared subsurface.[1]

Therefore, in many countries for land transportation, train become the main public transport rather than other transportations like bus. While many countries use train as public transport, in Indonesia many railway track which have been built in the Dutch era were dismantled, especially the track that connected some small city, and public transportation move to bus etc. The remaining railway track network which still be operated up to this moment are the track connected big cities like Surabaya to Semarang and Jakarta, from Jakarta to Bandung, Jakarta to Cirebon - Purwakarta and Jogjakarta, and other big city in Java and Sumatera. However, the quality of train in Indonesia which manage by PT. Kereta Api Indonesia (PT. KAI) or Indonesia Raliway Company Inc., are getting improve from the time to time. Many luxury executive class of train especially in Java are launched, in addition also the effort to cut the time travel.

The demand on short time travel has improved from time to time. Start from that demand, the government launch the high speed train programme for Jakarta to Bandung.

### **History of Railway Jakarta – Bandung**

On 17 May 1884 the territory of the Dutch East Indies (Indonesia at that time) has been built a railway track connected Jakarta to Bandung and conducted by the Staatsspoorwegen company. This track was the extension of Jakarta to Bogor route. The reason for the construction of this railway because of the Dutch colonial interest to have the train which can reached Bandung and also to facilitate the trade between Jakarta and Bandung and vice versa. The railway track of Bogor - Sukabumi - Cianjur - Bandung has a length of 194km, and can be traveled about 9 hours at the time. The locomotive used at the time was a steam Locomotive type DD52 (Figure 1.1) which can travel at maximum speed of 40 km per hour.



Figure 1.1. Steam Lokomotif DD52 [2]

However, the railway line of Jakarta Bandung via Bogor as well as Sukabumi were considered ineffective, so in 1906 the route changed through Karawang -

Cikampek - Purwakarta where the length of route become shorter namely 156 km, and takes more or less 6 hours and still uses locomotive type DD52 (Figure 1.1 ). At the end of the year 1934 Staatsspoorwegen upgrading a faster locomotive type, that was a C28 type locomotive (Figure 1.2), which have maximum speed of 95 kmh. In the trial this train locomotive can run at a maximum speed of 95 kmh on the flat track and 55 kmh in the mountainous track with curve a bend radius of 150m. The time travel using using locomotive type C28 was only 2 hour 45 minutes, 3 hour 15 minutes faster than using locomotive type DD52.



Figure 1.2 Steam Lokomotif C28 [3].

In 1953 Indonesia Railway Company (Jawatan Kereta Api, at the moment) begin using diesel locomotives, by using CC200 diesel locomotives which have maximum speed of 100 kmh, and the first diesel locomotive in Indonesia. Furthermore, In 1986 up today Indonesian Railway Company (PT. Kereta Api Indonesia (PT. KAI)) used diesel locomotive type CC201, CC203, CC204, and CC206 wich have maximum speed of 120 kmh service 166 km lenght railway Jakarta – Bandung.



Figure 1.3 Diesel Lokomotif CC206 [4]

In 2008 during Presidency of President Susilo Bambang Yudoyono High Speed Railway transportation was introduced. In the year 2016, corporation with Chinese Government, the first High Speed Railway in Indonesia, have started marked by the ground breaking. High Speed Railway of Jakarta to Bandung were planned have 416.6 kmh of maximum speed with average speed 300 kmh and can be traveled Jakarta to Bandung not more than 1 hour or exactly just takes 54 minutes. Figure 1.4 show the prototype of high speed train which will be used in high speed railway Jakarta – Bandung.



Figure 1.4. China High Speed Train CRH380A [5]

## 1.2 High Speed Railway Jakarta – Bandung

High Speed Railway Jakarta - Bandung will become the first High Speed Railway in Indonesia. It was intended to reduce the travel time between Jakarta to Bandung from more than 3 hours to become only 54 minutes.

Jakarta – Bandung railway track construction are divided into three types of construction, namely at grade, at elevated, and at tunnel. At grade construction located at Halim station, at elevated construction are used in metropolitan area to avoid cross with the often traffic, while at tunnel construction are used in rural or mountainous area. Figure 1.5. show the map of the track construction. In this final assignment will be design and calculated of at elevated or fly over high speed railway track by using box girder.



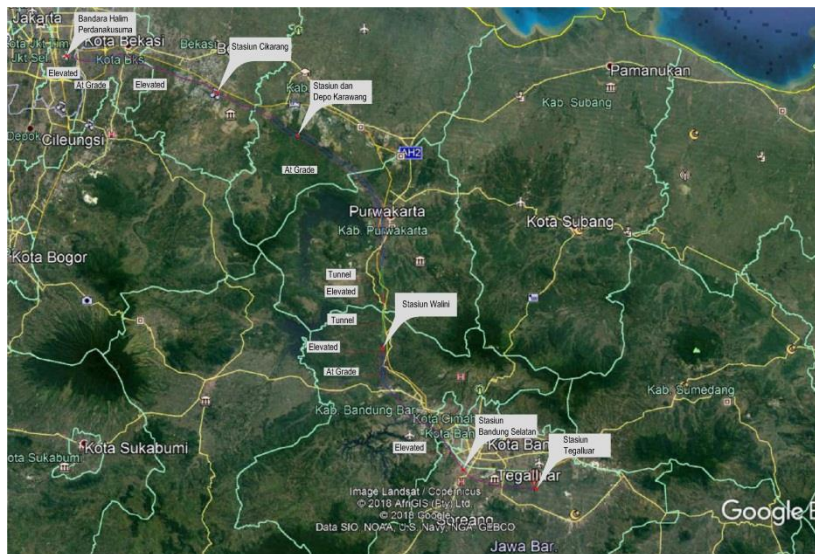


Figure 1.5. Map of the track construction

### 1.3 Problem Limitation

From the above background limitation are made, among others as follow:

1. Box girder single cell are use for at elevated Jakarta – Bandung HST.
2. Don't calculate vibrations on the box girder due to train speed.
3. Don't counting material requirement.

### 1.4 Objective of the Study

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

1. To design at elevated or fly over High Speed Railway track by using box girder.
2. The dimensions design of the pre-stress box girder,
3. Analyzing the load on the bridge structure,
4. Analyzing the loss of pre-stressing force that occurs on the pre-stress box girder,
5. Analyzing the resistance of the pre-stress box girder profile to the bending and sliding moments.

## **1.5 Scope of the Study**

To achieve those objectives, the study began with reviewing all of the literatures especially pertaining on box girder bridge construction of high speed railway. Study will continue with Methodology, where methods to fulfil the objectives will be describe, all part of the high speed railway bridge will be describe and explained. Design will be given in chapter four, while the results will be given and discussed in chapter five. In addition, design drawing will be given in attachment.