

# CHAPTER I

## INTRODUCTION

### 1.1. Background

Train is the most economic of land transportation compare to the a other moda of land transpotation. In one movementusing one locomotive, means one engine, train can tow about ten wagons containt about 500 people, Train also has special way call railway, more there train is the safe, as well as comfort of mode land transportations. In many countries train become the main public transport rather than other moda transportation like bus.

The history of the railroad in Indonesia began on June 17th, 1864 where the Dutch Governor General L.A.J.W. Baron Sloet van Beele started the construction of the first railway on the island of Java railway (Nederland-Indische Spoorweg Maatschappij), and the first railway operated was between Semarang and Tanggung which opened on August 10th, 1867. [1] The Station Semarang can be seen in Figure 1.1.

The line turned out to be unfortunate so the company turned to the government to help complete the rest of the construction of a still unfinished railway line which is 166 km into jogjakarta via Vorstenlanden. The construction cost for this line was very large because it was built using the standard of track width (railway width or distance to rail) of 1435 mm.[1]

The huge development cost for the 1435mm course then in 1869 gave birth to the decision to use a smaller railway track, but more economical and more suitably trajectory 1067 mm as reported by J.A. Kool and N.H. Henjkeet, and

until now railway in Indonesia using width trajectory 1067 mm. In fact, the law at that time allowed the railway to be constructed with a width of 1067 mm for public rail traffic, and 600 mm width for the feeder.[1]

The first railway line with a 1067mm track width was built by Nederlandsch-indie Spoor NIS connecting Batavia (Jakarta) and Buitenzorg (Bogor), and opened on January 31th, 1873 after two years of construction, the line was very profitable but separated from the others belonging to NIS in Central Java and East Java so that it was later sold to the SS company in 1913.[1] The construction of railway track in Java Island can be seen in Figure 1.2.



Figure 1.1 Station Semarang , 1867. Source [2]

The government then began to intervene directly in the construction of railroads after a long, hesitant time because the Dutch liberal government in Europe preferred the private sector to handle the railroad construction in the Netherlands-Indies. Nevertheless railway state enterprises consider the need for strategic objectives. On May 16th, 1878 the first railroad track built by the State, Staatsspoor en Tramwegen in Nederlandsch-Indies (State Railway) connecting Surabaya and Pasuruan, was opened. Three years later, the construction of a railroad connecting Bogor to Cicurug in West Java began with the goal of reaching Cilacap, an important port city on the southern coast of Java.[1]

In 1884, the SS line from the East reached the city of Surakarta, and in 1888 the main line of the NIS company from the west reached the city of Cilacap. The continuous railway line between Jakarta and Surabaya was completed in 1894 with the completion of a path between Maos and Cibat. The journey between Jakarta and Surabaya at that time took three days or exactly 32 1/2 hours because at that time the train did not run at night, and the difference of the existing trajectory forced the passengers to change trains in Jogjakarta and Surakarta. It is, however, an increase in travel time when compared to horse-drawn carriages that take two weeks for the same distance.[1]



Figure 1.2 The construction of railway track in Java Island. Source [3]

Semarang - Joana Stoomtram Maatschappij in 1881 received a connection to build a light tramway between Semarang and Juawana. This is the first company to receive concessions from 15 tram companies in Java. Tram roads are usually built for agricultural development, especially sugar cane and sugar mills, tobacco and rubber gardens and forestry. The network also functions as a feeder for the main line. The tramway is built according to certain standards to be converted into the main railway (Negara) and some tram lines have in fact been upgraded to the standard of the main railway line.[1]

Sumatera has first railroad in 1876 that connects Ule Lhee with Banda Aceh (later Koetaradja). A 4 km railway was built for military purposes, and uses a width of 1067 mm. With the war Aceh railroad track is extended along with the Dutch army majuny. The first significant economic railroad in Sumatra was built in 1886 by Deli Spoorweg Maatschappij connecting Labuhan and Medan. This line serves the fertile area of Deli, and then serves Belitang, Tanjungbalai, Rantau Prapat and Pematang Siantar. The last Bangian of the path to Rantau Prapat was completed in 1937.[1]

The width of the track on the Aceh track was changed to 750 mm and completed in connection with Besitang, 520 km southeast of Banda Aceh in 1917, where the meeting was built by Deli Spoorweg Maatschappij from Medan. Atjeh Staatsstoomtram was transferred from the military to the SS in January 1916, but later, the Aceh situation was not truly peaceful so that the railway line remained in the hands of the military until the end of the Dutch role.[1]

The Dutch East Indies government built a railway line in the Minangkabau area of West Sumatra between 1891 and 1894, which connects Bayur Bay and the Lunto Sawah coal mining area. This 158 km long line has opened Bukit Barisan, uphill to 773 m, and requires a 43 km climbing line between Kayutanam and Tabal Stone. This hike is the longest hiking trail in Indonesia. The railway is also heading to Bukittinggi (later named Fort de Kock) and Payakumbuh, two places that are relatively important for the area.[1]

In the southern part of Sumatra, the government built a railway line from Panjang (then Oosthaven, fery port to Java) to Kertapati (across the Musi River from Palembang), and headed to Lubuklinggau, which also serves the Tanjung Enim coal mine. Construction began in 1914 and completed in 1932.[1]

The only railway line outside Java, Madura and Sumatra is in South Sulawesi which was opened in 1922. This railway line serves Ujung Pandang to

Takalar with a distance of 42 km. Unfortunately this line was then closed in 1930 because less crowded.[1]

In contrast to rail services increased. In 1899, a third railway using a standard width of trajectory was installed connecting Jogjakarta and Surakarta, although the new passenger train operated on 1 February 1905.[1]

The opening of the new route through the Priangan mountains in West Java on May 2nd, 1906 is a new round of fast passenger train that serves Jakarta and Surabaya which is only 23 hours but all the time it takes 2 days, because the train only runs during the day.[1]

On December 31th, 1912, a law permitting the construction of the Cirebon - kroya line was issued. Unfortunately the first world war has hampered development. Nevertheless it can completed the original path through bandung, and shorten the 44 km distance between Jakarta and Surabaya. In 1918 the rail ban for night passages was lifted. The lifting of this ban shortens the travel time of Jakarta's passenger train to Surabaya to just 17 hours.[1]

Today in the modern era, the 750 km distance from jakarta to surabaya can be traveled 9 hours by express train. News the last by developing of technology of railway track and engine for locomotive, statrt at 1962 by the train called Shinkansen, Japan has began, and become pioneer, in using High Speed Train. Now days, after the first Shinkansen was launched. There are many High Speed Train have been operated in many countries in Europe and in China. The High Speed Train 700 Series Shinkansen can be seen in Figure 1.3.

To reduce the time travel between Jakarta to Surabaya the government of the republic of Indonesia have planned of operated High Speed Train for Jakarta – Surabaya. Unfortunately the goverment plan is use High Speed Train but Semi High Speed Train. This Goverment plan have to be reviewed and become the

theme of this Final Assignment. Beside review of Government plan on Semi High Speed Train, in this final assignment will also made the design of Jakarta – Surabaya High Speed Track.



Figure 1.3 700 Series Shinkansen in China. Source [4]

## **1.2. The Plan of Jakarta - Surabaya High Speed Train.**

In the year 2016, the Government of Republic of Indonesia have planned to build High Speed Train track for Jakarta to Surabaya. Preliminary planning have been made and the plan was not High Speed Train but Semi High Speed Train. Detail of the preliminary planning will be described in Chapter 2 of this report.

## **1.3. Problem limitations**

Based on description above, this Final Assigment is limited to:

1. Study feasibility of Jakarta – Surabaya High Speed Train.
2. Design one span of elevated track of Jakarta – Surabaya High Speed Train.
3. Use non ballasted track.
4. Use prestressed concrete I – beam for girder.

#### **1.4. Objectives of the study**

The objectives of the Final Assignment is to Design and Calculation of Jakarta – Surabaya elevated High Speed Train Track with the Upper-structure bridge using the Prestressed Concrete I Beam for Girder.

#### **1.5. Scope of the study**

To achieve this goal, firstly the study will review all primary literature related to fast railway construction and using of new lines. The study proceed by the Methodology, which the method to find the objectives will be explained, followed by calculations will be used by the new rail fast track. Design and calculation of the High Speed Train Jakarta - Surabaya will be given in chapter 4 and 5 in this part will give the conclusion and recommendation from the research.