

# The operation of the smart system construction essay



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Kuala Lumpur is the capital of Malaysia and becomes a well known international city with a large number of high rise buildings. Klang River overflowed its bank and flooded the city which between Tun Perak Bridge and Dang Wangi Bridge on 26 April 2001. Besides that, Kuala Lumpur has a very dense population and most of the residents are driving their own vehicle to works. This substantially brings a serious congestion especially during working hours. Government has decided to formulate the Stormwater Management and Road Tunnel (SMART) project to mitigate the floods and ease of traffic congestion which is carried out through a joint venture pact between MMC Corp Berhad and Gamuda Berhad with the Department of Irrigation And Drainage Malaysia and the Malaysian Highway Authority.

Every mega projects in the world will undergo long process during the design phases in order to produce a best and unique product. SMART project also faced the same situation and it has its own uniqueness whereby it combines the wet and dry tunnel in a structural element. The SMART Project is an innovative solution that it serves a dual purpose of mitigates the floods and ease of traffic congestion at Kuala Lumpur. Generally, the SMART tunnel consist of a bypass tunnel constructed from underground from the upstream of Kang River towards Taman Desa which is about 9.7km in length. Besides that, there will be a holding basin in Kampung Berendam, a storage reservoir at Taman Desa, a twin box culvert structure and control gates structures.

SMART tunnel is constructed by using the tunnel boring machine method. The tunnel is constructed into two decks motorway which is the upper deck and lower deck. Moreover, at the bottom of lower deck, there will be a place for the water to channel through the tunnel. The safety of the tunnel is

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consider as good because it is surrounded by close circuit television, 24 hours of patrol, equipped with the necessary firefighting equipment, first aid and emergency phone in the event of emergency happened. Other features of tunnel are good ventilation to maintain the air quality in the tunnel by using strong ventilators.

This SMART tunnel wrote a new page of building technology in Malaysia by bring in a few tunneling technology such as tunnel boring machine. It definitely shown a new step took by the government in enhances the national transportation system and flood issue as well.

## 1. 2 Problem Statement

Kuala Lumpur is a nerve centre for Malaysia's economy and it is a capital of the Malaysia. Every year, there is an occurrence of heavy floods in this area and resulted in extensive damages. The city is also subject to traffic congestion due to the population increase in the city. In order to address the problem, government decides to build a Smart Tunnel to solve the both issue carried out through a joint venture pact between MMC Corp Berhad and Gamuda Berhad with the Department of Irrigation And Drainage Malaysia and the Malaysian Highway Authority as the executing government agencies.

Smart Tunnel is serving a dual purpose which is ease of traffic congestion and mitigates the floods issue in Kuala Lumpur. However, Kuala Lumpur's SMART Tunnel is not looking so smart anymore as the there is occurrence of heavy flood at Jalan TunRazak and Kampung Baru (The Star Online, 2011). Besides that, the heavy traffic congestion in Kuala Lumpur still cannot be solve even the SMART tunnel has been constructed with its <https://assignbuster.com/the-operation-of-the-smart-system-construction-essay/>

secondary function which is serve to ease the traffic problem. In order to understand better on how the SMART tunnel operates, maintain and the effectiveness of its function, it is necessary to carry out a research on how the water is diverts and how it½½s serve to ease the traffic at Kuala Lumpur.

### 1. 3 Aim and Objectives

#### Title

A Study and Evaluation of SMART Projects in Malaysia

#### Aim

To establish the conceptual model of SMART projects in serving the dual purpose of flood mitigation and ease of road congestion.

#### Objectives

The objectives of the study are

- (i) To ascertain the operating system and maintenance system of SMART tunnel.
- (ii) To identify the effectiveness of the smart tunnel in mitigate flood and ease of traffic congestion.
- (iii) To study the benefits of SMART tunnel by comparing before and after the construction of SMART tunnel.

### 1. 4 Scope of Study

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In this research proposal, three main aspects will be focused and carried out such as the operating and maintenance system of SMART Tunnel. This is mainly study on how the SMART tunnel reacts; operate when there is a heavy flood and how is the maintenance system of the SMART tunnel. Besides that, an analysis on the effectiveness of the SMART tunnel will be carried out. Benefits of the SMART tunnel will be study by comparing the before and after of the construction of SMART tunnel.

On the other hand, the other three aspects that will not be focus throughout the research proposal will be the management system of the SMART tunnel, the comparison on the performance of the structure under seismic loading when there is an occurrence of earthquake and the construction method used in constructing SMART tunnel.

## 1. 5 Research Methodology

Methodology in a simplify term can be defined as a term whereby it enable the research;½½s goal and objectives can be achieved effectively. So, it is important that a systematic methodology should carry out in order to collect all the necessary and important information to get a best result for the study.

Generally, the methodology of this research proposal is as follows:

### First stage (Literature Review)

In this stage, the study will begin with the formulation of research aim, objectives and problem statement. At this early stage, some of the

secondary data will be use as reference such as articles, reference books  
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and newspaper. Secondary data is used in this stage in order to understand the topic thoroughly thus formulates the aim, problem statement and objectives of the research proposal.

### Second stage (Interview/Questionnaire/Case Study)

After the formulation of aim, objectives and problem statement, other necessary information will gather from primary data. The relevant information will be acquired through primary sources such as interview, questionnaire and case study. The relevant respondents that have knowledge towards the topic will be interview and questionnaire approach will also be conducted by distribute a number of questionnaires to the respondent to fill up.

### Third Stage

After collecting all the relevant data, the data will be analyse by using a analysis method to analyse whether the objective of the research has meet. The effectiveness of the SMART tunnel in mitigates the floods and ease of traffic congestion will be analysed at this stage and another method of analysis will be done by comparing the benefits before and after the construction of SMART tunnel. Then, the result will be presented in the proposal itself.

## 1. 6 Chapter Planned

The research proposal mainly comprises of five chapters which as shown below:

## Chapter 1

Chapter 1 of the research proposal is just a brief on the research proposal. In this chapter, a brief introduction of SMART tunnel will be discussed. Then the aim, objectives, problem statement and scope of study will be formulated after read through the relevant information of SMART tunnel. Besides that, research methodology, the flow of chapter and planning of chapter will also be identified at this stage. At last, a work programme will be prepared by comparing the pre-planned work and actual work done throughout the research proposal.

## Chapter 2

The objectives that formulated in chapter 1 will be discussed more detail in this stage. In this chapter, the mode of operating and maintenance system of SMART tunnel will be study and discussed by referring to the books, journal and articles. Meanwhile, the effectiveness of the SMART tunnel in mitigates the flood and ease of traffic congestion will be elaborate thoroughly by referring to the articles. Then, the benefits of the SMART tunnel by comparing the before and after the construction of it will be identified and discussed at this stage.

## Chapter 3

This chapter is mainly focus on the methodology used in preparing the research proposal. Obviously, the methodology used which is primary data. Interview and questionnaire will be conducted by interview a person who had knowledge on the SMART tunnel such as Architect, Engineer and Quantity

Surveying. Questionnaire will be distributed to the road users that uses SMART tunnel at least five times in a week.

#### Chapter 4

After the collection of primary and secondary data, a detail analysis will be carried out by using the SPSS software to calculate the outcome. This will be applied to the questionnaire collected after filled up by the road users and the interview being conducted with the Architect, Quantity Surveyor or Engineers whereas the interview will be analyse by writing it into an essay form in research proposal.

#### Chapter 5

Chapter 5 is the conclusion part prepared after the analysis of the data collected. A possible recommendation will also be produced in order to provide alternative solution to the statement as stated in Chapter 1.

#### 1. 7 Summary of the Proposal

Flow Chart 1: Summary of the proposal

Source: Wong Yee Vern

#### 2. 1 Introduction

In the year of 2001, Government has sort out a solution that would allow a severe flood to enter into the city without flooding or cause damage to the city centre. An idea was proposed by the Government to implement a project named SMART Project by constructing a tunnel which serve a dual purpose in

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mitigates the flood issue and ease of traffic congestion. The procurement method of this project is design and build contract and is carry out by a joint venture between Malaysian Mining Corporation and Gamuda Sdn Bhd. Meanwhile, the concessionaire of the project is Syarikat Mengurus Air Banjir & Terowong Sdn Bnd and undergoes a concession period of 40 years. The construction method of SMART tunnel is using Tunnel Boring Machine (TBM) method and it cost around RM 1. 9 billion to construct. Design of the tunnel is consider as unique as it is divided into 2 decks and the length of the tunnel is about 9. 7 km with an outer diameter of 13. 2m. The construction of SMART Tunnel began on 25 November 2003 and officially operates on 14 May 2007.

## 2. 2 Physical Components of Stormwater System

The SMART system is a sequence of storage, attenuation and regulated flow. The system diverts flood discharges from the city centre and subsequently releases them downstream while ensuring the flood problem is not transferred elsewhere (Ir. Ng Koh Hing, Ir. David N. Welch & Subathra Devi Ramachandram, 2008). No overflow shall occur by ensuring the system optimizes the storage, attenuation and regulation within and adjacent to the system. Generally the bypass system consists of intake and outlet system.

Besides that, the intake and outlet system consist of a debris removal system complete with floating booms, trash rack and a debris removal and disposal unit. A river flow diversion system complete with a 4-bay diversion weir structure and an 8-bay offtake structure shall also be part of the intake and outlet system. Then a set of twin box culverts which gated at both end

conveys the discharge from storage reservoir to Kerayong. Moreover, a holding pond will be situated at the upstream of the tunnel with a storage capacity of 600, 000 cubic metres and a storage cum attenuation pond with a storage capacity of 1, 400, 000 cubic metres located at the downstream end of the tunnel.

## 2. 3 Operation of the SMART System

When there is an event of downpour of rain, the data collected will be analysed to predict the operation mode of SMART Tunnel. For instance, when mode II is predicted by the analysis of data collected then action will be taken accordingly. Initially, this means that the defined operating rules will be operated and the sequence of operation will be displayed for monitoring and supervision purpose in Stormwater Control Centre (SCC) which involved the operation of various gates. The mode of operation of SMART tunnel will be subdivided into 4 modes.

### 2. 3. 1 Operation Rules of SMART Tunnel

Before

### 2. 3. 2 Modes of Operation

The operation of SMART tunnel and motorway is depend on the flood condition at the upstream of Klang River or Ampang River and works on four principle mode. The principle mode of operation system of SMART tunnel can be referred to figure 1. 2.

Mode I

This is the mode when the raining water is very little and traffic is allowed in the tunnel thus no diversion of water into the tunnel is required.

#### Mode II

This mode is activated when the flow rate is between 70-150m<sup>3</sup>/s which means that when the flow rate of the rainwater recorded at the upstream is between these rate, Mode II will be automatically activated. The road tunnel traffic will remain opened to the road users but the excess flood water will be diverted to the holding pond and the lower deck of the tunnel will channel the flood flow to the attenuation pond with a flow rate of 50m<sup>3</sup>/s.

#### Mode III

When there is a heavy rain fall, this mode will be activated and the flow rate is 150m<sup>3</sup>/s or more. However, the traffic is motorway is required to be close down in order to allow the water channel through the both tunnel. Under such circumstances, the tunnel will be close up to 8 hours after the rain stops to do some maintenance work.

#### Mode IV

After the 2 hours of declaration of Mode III, this mode will be activated if the rain water storm prolong and the road tunnel will be re-opened to the traffic only within 4 days of closure. Moreover, the tunnel will be used for channel the floods after the completion of evacuation of traffic.

Figure 1. 2 Operation Mode of SMART tunnel