

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

Methodology is a process to describe how the project will be done in detail. In this chapter, all the information about the research will be collected including preliminary work, information gathering, flow characteristics measurement, and equipment that were used. Through this chapter, all the information and procedure to achieve the objectives of the research will be explained clearly.

#### **3.2 PRELIMINARY WORK**

At the start of the research, self-study had to be done such as searching journals, articles and magazines which are related to the title. By studying those materials, more knowledge can be gained to form the idea and concept of what has to be done as well as what kind of methods can be applied in the research. Other than that, reading the catalogues of the equipment to be used also has to be done to understand how they work. Moreover, meetings with staff of JPPH, site visit with supervisor and JPPH's staff as well as calibration of equipment had to be done before collecting the flow rate data.

### 3.2.1 Information Gathering

All the information was obtained from journals and articles related to flow characteristics. Owing to the research area being within UMP, the drawings were requested from UMP Holding Bhd and JPPH. Those drawings include UMP site plan and UMP sewer reticulation site plan which are attached in Appendix A. There are very few local studies on the topic of this research because it is still quite new in Malaysia.

### 3.2.2 Site Visit



**Figure 3.1:** Site visit at the area between library and sports complex

Site visit is a compulsory activity in this research. It is very hard to reconnaissance a suitable manhole to do research because the criteria of the manhole are directly related to the sewer pipe. Determination of manhole location is dependent on several criteria. Manholes are usually situated at sewer lines having a change in direction, gradient or size of sewer. Other criteria of the manhole to be selected in this research is that the manhole needs to be shallow, will not flood and the location is near to the STP. In this research only one manhole is required. During the site visit in UMP area, six manholes were inspected including one in Residential College, KK2. The reason KK2 manhole was not chosen is because the sewer floods frequently. The

manhole located in between library and sports complex was selected and is shown in Figure 3.1.

### 3.3 STUDY OF THE SITE

One manhole (MH 7) had been selected in UMP area between the library and sports complex with PE of 1473. This site was used to analyze flow characteristics in sewerage system of the area studied. Once the preliminary work had been done, calibration of flowmeter, installation of software and load test can start. The purpose of the load test is to make sure the hanger can support the flowmeter, so that the flowmeter will not fall down. 4.5 kg of water simulated the weight of the ISCO 2150 Flowmeter for one week. The flowmeter including the batteries and sensor is 4.3 kg as weighted in the lab, shown in Figure 3.2. At the end, the load test achieved its objective and managed to sustain 4.5 kg of water. So there is no problem to hang the ISCO 2150 Flowmeter inside the manhole.



**Figure 3.2:** Weighting flowmeter (including batteries and sensor)