



**DEPARTMENT OF BUILDING**  
**UNIVERSITI TEKNOLOGI MARA**  
**(PERAK)**

**EXTERNAL COLD WATER SUPPLY SYSTEM**

**Prepared by:**

**AHMAD RAZLAN ALIF BIN ZURAIMI**

**2017206622**

**DEPARTMENT OF BUILDING  
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING  
UNIVERSITI TEKNOLOGI MARA**

**(PERAK)**

**DECEMBER 2019**

It is recommended that the report of this practical training provided

**By**

**AHMAD RAZLAN ALIF BIN ZURAIMI**

**2017206622**

**Entitled**

**External Cold Water Supply System**

Accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

Report Supervisor : \_\_\_\_\_  
Pn. Nurhasyimah binti Ahmad Zamri

Practical Training Coordinator : \_\_\_\_\_  
En. Muhammad Naim bin Mahyuddin

Programme Coordinator : \_\_\_\_\_  
Dr. Dzulkarnaen bin Ismail

**DEPARTMENT OF BUILDING**  
**FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING**  
**UNIVERSITI TEKNOLOGI MARA**  
**(PERAK)**

**DECEMBER 2019**

**STUDENT'S DECLARATION**

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated here in, prepared during a practical training session that I underwent at YEO PLUMBER SDN BHD for 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

Name : AHMAD RAZLAN ALIF BIN ZURAIMI

UiTM ID No : 2017206622

Date : 13 DECEMBER 2019

## **ACKNOWLEDGEMENT**

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful.

I would like to extend my heartfelt gratitude for the guidance, advice and help rendered throughout the period of training by the following group of amazing individuals. First and foremost, I would like to thank Encik Heng Eik Woei for the opportunity given, to conduct my training in his engineer department. His team of professionals comprising of Puan Nurul Nadia, Puan Noor Farahana, Encik Mohammad Haiqal and Encik Ahmad Wafiy have enabled me to learn and develop my understanding, knowledge and feel of real time projects. They are also responsible towards streamlining and assessing my training. Also to all the company staff who have helped me to better understand management in pipe installation and operation systems and help to further enhance my ability in understanding the procedures in construction and site administration, tests procedures, site safety and best practices in the industry. It is an honor for me to be given the opportunity to 'work' with all of you.

I would also like to thank ALL the UITM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To Puan Nurhasyimah Binti Ahmad Zamri, Supervising Lecturer, Encik Muhammad Naim bin Mahyuddin, Practical Training Coordinator Dr. Dzulkarnaen bin Ismail, Programme Coordinator. I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

Last but not least, my special thanks to my beloved parents for their sacrifices over the years.

Thank you so much.

## **ABSTRACT**

Installation of plumbing systems is usually done during the early stages of construction of a building to be built. Various procedures need to be done before plumbing can be carried out such as obtaining approval from the SAJ (Syarikat Air Johor). This report will focus on how a plumbing system is installed under construction and the tools used to install the plumbing. This report also describes the method statement of how the piping system is handled in more detail. This report will focus on how the installation of external cold water supply system is done until the water can be channeled into the building also ensures adequate water pressure can be supplied and properly distributed throughout the construction area. Various procedures will be described to provide a more detailed approach from the installation aspect to the pressure test on the pipe. This report will focus on various aspects, from the start of the pipe installation until water pressure test will be conducted to test the strength of the pipe.

NO	CONTENTS	PAGE
	Acknowledgements	i
	Abstract	ii
	Contents	iii
	List of Tables	iv
	List of Figures	v
<b>CHAPTER</b>	<b>1.0 INTRODUCTION</b>	<b>1</b>
	1.1 Objective	3
	1.2 Scope of Study	3
	1.3 Research Method	4
<b>CHAPTER</b>	<b>2.0 COMPANY BACKGROUND</b>	<b>5</b>
	2.1 Introduction of Organization	5
	2.2 Organization Profile	6
	2.2.1 Vision & Mission of Organization	6
	2.2.2 Objective	6
	2.2.3 Construction	6
	2.2.4 Maintenance	6
	2.3 Organization Chart	7
	2.4 List of Project	8
	2.4.1 Completed Projects	8
	2.4.2 Project in Progress	9
<b>CHAPTER</b>	<b>3.0 CASE STUDY</b>	<b>10</b>
	3.1 Introduction to Project	10
	3.2 Case Study	12
	3.2.1 Setting out tapping angle	13
	3.2.2 Installation hot tapping machine	13
	3.2.3 Installation two type of pipe	18
	3.3 Testing Method	27
	3.3.1 HDPE Polyethylene pipe	27
	3.3.2 MSCL pipe	28

CHAPTER 4.0	CONCLUSION	31
REFERENCES		32

## LIST OF TABLES

Table 2.1	The list of Yeo Plumber SDB BHD Completed Project	8
Table 2.2	The list of Yeo Plumber SDB BHD Project in Progress	9
Table 3.1	Equipment for Hot Tapping operation	24
Table 3.2	Equipment for HDPE Polyethylene pipe installation	25
Table 3.3	Equipment for MSCL pipe installation	26
Table 3.4	Equipment for HDPE pipe water pressure test	29
Table 3.5	Equipment for MSCL pipe water pressure test	30

## LIST OF FIGURES

Figure 1.1	Hot Tapping Equipment	2
Figure 2.1	Location of company Yeo Plumber SDN BHD	5
Figure 2.2	Organization Chart of YEO PLUMBER SDN BHD Source From Company Profile	7
Figure 3.1	The project signboard	10
Figure 3.2	The project site	11
Figure 3.3	Hot tapping operation	12
Figure 3.4	Types of Hot Tapping angles	13
Figure 3.5	Excavation to find SAJ main pipe line	14
Figure 3.6	Steel Flanged Tee installation	14
Figure 3.7	Welding operation	15
Figure 3.8	Sluice Valve installation	15
Figure 3.9	Drilling SAJ pipeline using Hot Tapping Machines	16
Figure 3.10	SAJ pipeline steel coupon	17



Figure 3.11	Sluice Valve fully installation	17
Figure 3.12	Water Meter (blue) & Hydrant Meter (red)	17
Figure 3.13	HDPE Polyethylene pipe	18
Figure 3.14	HDPE pipeline excavation	18
Figure 3.15	HDPE Polyethylene pipe installation	18
Figure 3.16	HDPE Polyethylene pipe	19
Figure 3.17	HDPE Polyethylene pipe fitting	19
Figure 3.18	HDPE pipe backfilled with crushed run and sand	20
Figure 3.19	Internal cold water supply	20
Figure 3.20	MSCL Pipe	21
Figure 3.21	MSCL pipe installation process	21
Figure 3.22	Jointing of MSCL pipe fitting	22
Figure 3.23	MSCL fitting	22
Figure 3.24	Steel bracket installation	23
Figure 3.25	HDPE pipe water pressure test	27
Figure 3.26	MSCL pipe water pressure test	28

## CHAPTER 1.0

### PREFACE

#### 1.0 Introduction

Building water supply system is a system in plumbing which provides and distributes water to the different part of the building or structure, for purposes such as drinking, cleaning, washing, culinary use and others. It includes the water distributing pipe, control devices, equipment and other appurtenances.

One of the characteristics of a good building design is to have a good water supply channel whereby the water supply can be flowed smoothly and managed without any problems like pipe leaks and so on. The water supply system must be designed to achieve appropriate water pressure and flow, and to avoid contamination to potable water. As well as avoiding contamination and achieving the right pressure and flow, the system must be suitable for the temperature of water carried. A well-designed and installed system will also be durable, minimise noise from water flow and from problems such as water hammer, and support efficient use of water.

All water supply systems use a combination of pipes (of different dimensions and materials), valves and outlets to deliver water to building users. Some water supply systems also use storage tanks and pumps. Designing a water supply system involves getting all of these elements right so that clean water is delivered to the user at the appropriate rate, temperature and pressure.

Typically, pressure limiting or pressure reducing valves will be used to control pressure in mains-supplied systems or where high pressure may lead to problems such as burst pipes. Typically, new buildings in areas with mains water supply will have mains pressure systems. Buildings that are not connected to mains water supply may have low pressure systems or unequal pressure systems. (Level.org.nz, 2019)

External cold water supply must be properly maintained in accordance with proper specifications so that stable water pressure can be applied to the building area. The pipe size also plays an important role in providing a stable pressure to prevent

low water pressure in the pipe. Water pressure tests will also be done to test the water pressure in the pipe that has been properly installed.



**Figure 1.1 : Hot Tapping Equipment**

Hot tapping is a technique of attaching a welded branch fitting to piping or equipment as it remains in service, and then creating an opening in that piping or equipment by drilling or cutting a portion of the piping or equipment within the attached fitting. Hot Tapping by definition involves Hot Work on equipment “in service”. This method can be done without the need to shut down water flow from the main pipeline to obtain water supply. (The Process Piping, 2019)

## 1.1 Objective

Three objectives must be achieved for this report.

- i. To identify the method to supply water from SAJ main pipeline to the construction site.
- ii. To determine how to ensure adequate water pressure throughout the building and construction area.
- iii. To determine the testing method for external water supply.

## 1.2 Scope of Study

This study focuses on cold water supply as it was conducted to understand the method of installation of external cold water supply from the SAJ main pipeline to the construction site area. Title of this project is *Proposed Chemical Factory On Lot 91240, Jalan Industri Saleng 3, Mukim Senai, Daerah Kulai, Johor Darul Takzim Untuk Tetuan Transmare-Chemie (M) Sdn Bhd (Cold Water & Sanitary Services)*.

Cold water supply should be installed at the beginning of construction to supply water to the construction site which involves the use of water. Therefore, water extraction from SAJ main pipeline must be approved by the SAJ itself before installation of water channel outlet from SAJ main pipeline to the construction site being carried out. There are two types of cold water supply from main pipeline to construction area:

- I. Hydrant meter (fire hydrant)
- II. Water meter (domestic)

Those both water supplies have the same function but are different uses for each channel. Hydrant meter works to supply water to fire hydrant for firefighters use in case of fire while water meter works to provide water for indoor such as domestic use.

### 1.3 Research Method

Research method has been carried out by using several methods to gather as much information as needed to complete this report.

i. Observation

All information collected is based on the activities carried out at the site with the guidance of the site supervisor. The information needed during the construction phase was taken using the mobile phone by taking photos of site activities such as work progress, installation method and other activities that has to jot down on this report.

ii. Interviews

Interview method also plays a big role as it has been carried out by having interview sessions with Site Engineer from Yeo Plumber Sdn. Bhd. Many information and new knowledge on construction were gained from the interview.

iii. Document reviews

Based on all drawings provided, there are many information's achieve by doing studies on structural plans and drawings of related process of construction. Architectural drawings also help a lot to foresee on the outcome of all the construction process related to the case study.

## CHAPTER 2.0

### ORGANIZATION BACKGROUND

#### 2.1 Introduction of Organization

Yeo Plumber Sdn Bhd started off as a general plumbing contractor and over the year, they have involved to specialise mainly in Internal Cold & Hot water System, Sanitary Plumbing System, External Water Reticulation and Sewerage Reticulation System.

They are a CIDB G7 registered company which is the highest grade that allows the company to participate in tenders with unlimited contract value. Company also obtained the Certification for Quality Management System (ISO9001: 2015). In the meanwhile, they are currently working towards the Certification of ISO 45001: 2018 and ISO 14001: 2015.

To date, their company have completed many pretagious and iconic projects including Seagate Substrate Plant, Gardenia Plant, Mitsiu Outlet Park KLIA, Paradigm Mall Johor Bahru, IKEA Tebrau and Landed Properties.



Figure 2.1 : Location of company Yeo Plumber SDN BHD

## **2.2 Organisation Profile**

### **2.2.1 Vision & Mission of Organisation**

At Yeo Plumber Sdn Bhd, we have aligned ourselves only with quality and timely system delivery and we strive to become the leading plumber in our nation. Continuously, nurturing the next generation of high performers and giving back our profit responsibly to the society.

### **2.2.2 Objective**

Yeo Plumbing Sdn Bhd is a nationwide plumbing contractor with expertise in variety of building construction and plumbing system. We help ensure constructibility, maintainability and operability with our experience and specialisation in plumbing field.

### **2.2.3 Construction**

We provide construction services including for commercial, industrial, residential, infrastructure and specialty.

### **2.2.4 Maintenance**

We provide maintenance services including solution for troubles of plumbing system of commercial business.

## 2.3 Organisation Chart

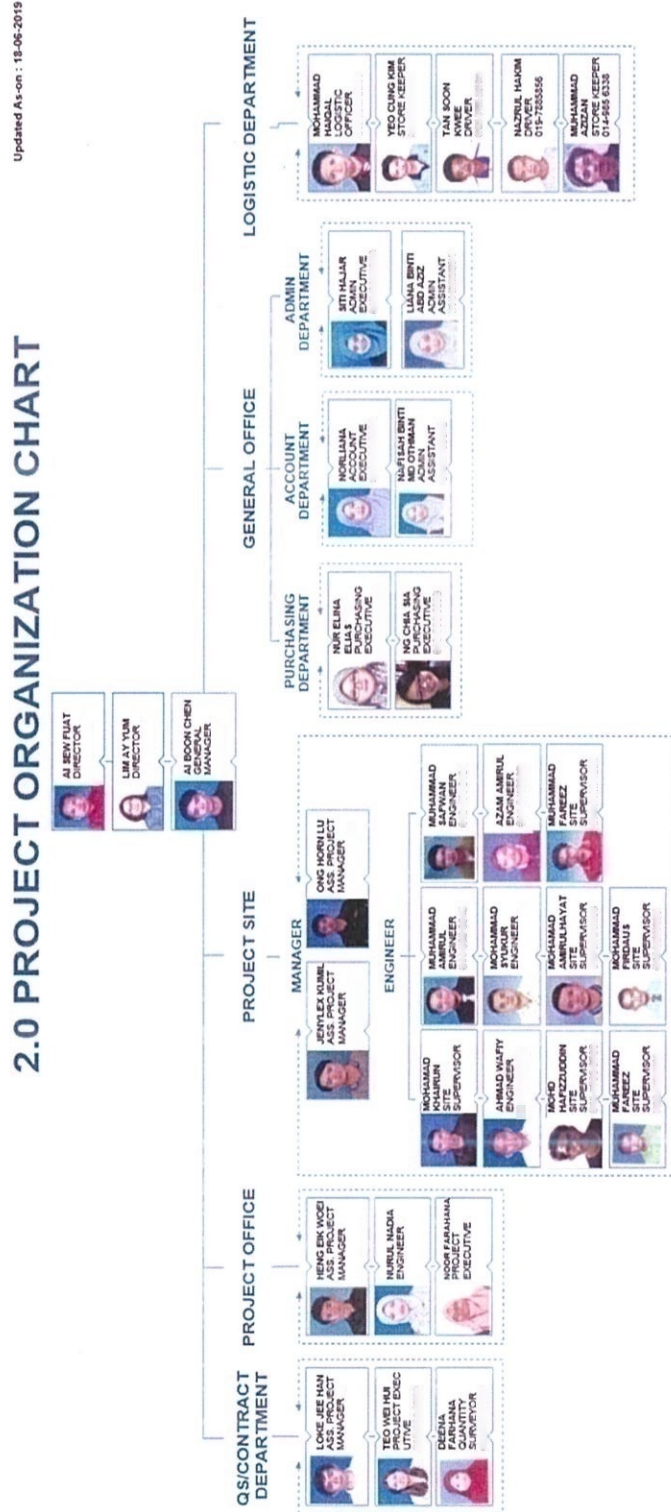


Figure 2.2 Organization Chart of YEO PLUMBER SDN BHD  
Source From Company Profile



## 2.4 List of Project

### 2.4.1 Completed Projects

**Table 2.1 : The list of Yeo Plumber SDB BHD Completed Project**

NO	PROJECT TITLE/CONTRACT	TYPE OF WORK	DATE OF COMPLITION
1	Permohonan Permit Bangunan Sementara Bagi Membina Hotel at Kota Tinggi	Sanitary & Cold Water Plumbing, Water Reticulation, Sanitary Wares & Fitting	2019
2	Proposed 7 Units Housing For The Enclave Development at Johor Bahru	Design, Construction, Supply, Installation, Testing, Commissioning & Maintenance of 200PE Sewage Treatment Plant (FRP Package) & Associated Work	2019
3	Super JDE Office	Plumbing Works	2019
4	The Proposed Senai Airport City Development	Hand Over Sewerage Pipeline Along Jalan SAC 4	2019
5	Proposed Renovation Works To Dewan Kencana Puri (DKP) at Pulau Spring Resort	Construction of New Toilet	2019
6	Cadangan Membina 1 Blok Pasaraya 4 Tingkat at Pulau Pinang	Internal Cold Water and Sanitary Plumbing System	2018
7	Proposed Retrofitting of Existing Shoplot to Newcastle Medical Clinic For NUMed Malaysia Sdn Bhd	Cold Water & Sanitary Plumbing	2018
8	Proposed Renovation Works To Existing Aeon Store at Aeon Tebrau City Shopping at Johor Bahru	Renovation Work For Plumbing and Sanitary System	2018

## 2.4.2 Projects in Progress

**Table 2.2 : The list of Yeo Plumber SDB BHD Project in Progress**

NO	PROJECT TITLE/CONTRACT	TYPE OF WOR	DATE OF COMPLITION
1	Proposed Chemical Factory at Senai	Cold Water & Sanitary Services	TBA
2	To Supply & Install Plumbing & Sanitary Works (Block A & B) For Permohonan Pelan Bangunan Di Bawah Akta 133 Bagi Tujuan Tambahan Perumahan Pekerja at Kulai	Plumbing & Sanitary Work	31/5/2020
3	Proposed Erection of 35- Storey Office Tower With 6- Storey Podium Carpark And 2 Storey Retail With 4-Storey Basement at Johor Bahru	Internal Cold Water & Sanitary Plumbing	TBA
4	Package C01 General Supply & Installation of Cold Water & Sanitary System For Sumitomo Electric Interconnect Factory M5 & M6	Cold Water & Sanitary System	30/12/2019

## CHAPTER 3.0

### CASE STUDY

#### 3.1 Introduction of Project

The project that was given to me during this practical training for the purpose of reporting was *Permohonan Pelan Bangunan Mengikut Akta 133 Bagi Cadangan Pembangunan Perindustrian Sederhana Di Atas Lot 91240 (GRN 568138), Jalan Industri Saleng 3, Mukim Senai, Daerah Kulai, Johor Darul Takzim*. The total cost for this project is RM 189,000.00. The scope of works for this project is Cold Water & Sanitary Service.

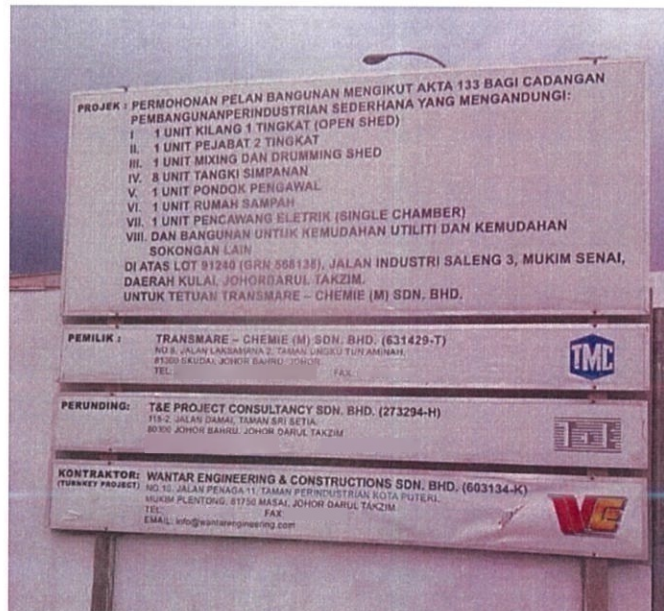


Figure 3.1: The project signboard



**Figure 3.2: The project site**

The purpose of this construction project is to build a chemical plant area built for the purpose of the chemical industry. This construction project includes construction for one unit of factory (open shed), one unit of office double storey, one unit of mixing and drumming shed, eight units of storage tank, one unit of guard house, one unit of garbage house, one unit of electric substation and buildings for utility facilities and other support facilities. The owner for this project is Cheme Sdn. Bhd. and main contractor for this construction project is Wantar Engineering & Construction Sdn. Bhd.

For the case study of this project will focus on how to install external cold water supply from SAJ main pipeline and distributed to construction area. Various installations and plumbing fixtures will be carried out to provide clean water supply to the construction site starting from the hot tapping of the SAJ pipeline to the two main components of the pipeline to the site area. There are two main components to the external cold water system, namely for domestic and hydrant use. For domestic, Poly pipe will be used while MSCL pipe will be used for fire hydrant purpose.

### 3.2 Case Study

#### **Method to supply water from SAJ main pipeline to the construction site using hot tapping equipment.**

Hot tapping is the technique used to attach a branch connection to a pipe while the system is in service, and then creating an opening in that pipe by drilling or cutting. While hot taps are most often done in piping system, they may also be done on pressure vessels and storage tanks to add nozzles. Hot tapping permit adding connections without depressurization or disruption of process operations. They may also be used to make piping connections where it would be inconvenient to prepare the system for hot work. Hot tapping is also used to isolate pipe sections for maintenance by plugging or stoppling the line.

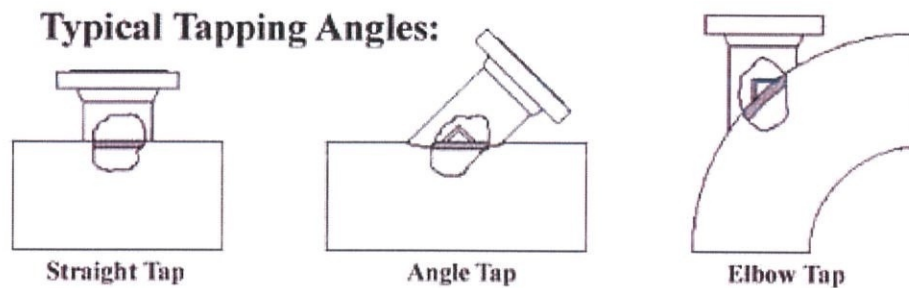
Hot tapping is an inherently dangerous operation. Therefore, hot tapping should generally be used only when it is impractical to take the system out of service. When specifying hot tapping, care is required in inspection, design, and testing to ensure that this operation is done in a safe and reliable manner. Therefore, a hot tapping should be considered only after other options are evaluated and rejected. Each hot tapping should be properly designed, the hot tapping location thoroughly inspected, and the installation procedures reviewed.



**Figure 3.3: Hot tapping operation**

### 3.2.1 Setting out tapping angle

A company needs to get approval from the SAJ before the hot tapping work is done. Once the application is approved by the SAJ, installation of such tools can be carried out. Here are some types of angles commonly used in hot tapping installations:



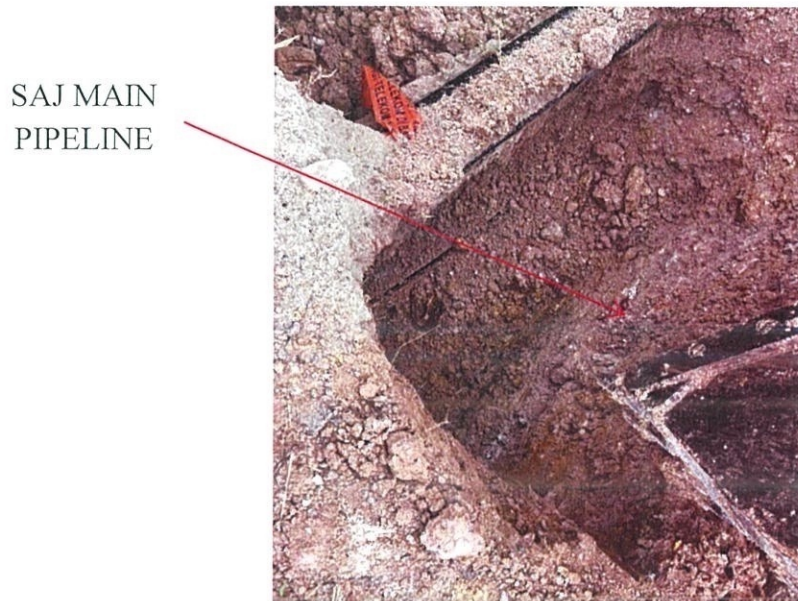
**Figure 3.4: Types of Hot Tapping angles (The Process Piping, 2019)**

Straight tap angle has been selected for application for hot tapping installation at this construction site. This is because installations using this method make it easier to practice in any construction or operation area. This method is often used by any contractor for the installation of isolation valves and tapping fittings to the main pipeline. Then, the connecting pipe from the isolation valve will flow to two meters inside the construction area. These are Water Meter and Hydrant Meter. These two meters will provide water throughout the construction area, which has the same function but different purpose.

### 3.2.2 Installation hot tapping machine

After obtaining permission from the SAJ, soil excavation works were carried at the location of the pipe run is surveyed and pegged by surveyor. The excavation continued until the SAJ pipeline was discovered. The excavated area will be cleared until the SAJ pipeline is clearly visible and workers can perform the tapping fittings and installation of hot tapping machines. Discuss job with maintenance, operating and safety personnel to assure complete understanding of what is to be accomplished

and how. Verify line contents, pressure, temperature, flow rate and pipe wall thickness. Discuss what items will be needed to complete job.



**Figure 3.5: Excavation to find SAJ main pipe line**

Following the excavation and clearing works, discussions were held to determine the aspects that need to be taken into consideration for installation hot tapping machine. Next, workers will be forming and planting the flanged tee. They need to make sure that the Tee is welded directly to the center line of the mainline and that it is horizontally towards the mainline. Take all necessary pre-cautions and remember to protect the surroundings with fireproof materials.



**Figure 3.6: Steel Flanged Tee installation**



**Figure 3.7: Welding operation**

Once the tapping fitting is complete, mount the sluice valve to the flanged tee and use approved gaskets. Put the gasket between the sluice valve and flanged tee to fill the surfaces, generally to prevent leakage from or into the joined objects while under compression. Tighten all bolts and nuts around sluice valve.



**Figure 3.8: Sluice Valve installation**

Hot Tapping is the ability to safely tie into a pressurized system while it is on stream and under pressure. Typical connections consist of a tapping fitting, isolation valve, and hot tapping machine. The hole saw is advanced through the valve, to the pipe.



Install tapping machine on valve, taking care not to bump pilot and cutter on valve. Align bolt holes of flanges. Install bolts and tighten evenly. Extend boring bar until pilot contacts pipe, retract slightly, and engage clutch. Remove crank. Install measuring rod and mark tapping measurements. Make sure that the valve is fully open and that the drilling shaft moves without any problem all the way from the mainline to the upper end of the body. The machine is engaged and the cut begins. Use maximum speed for the pilot drill and start the drilling slowly. When the cut is finished, the machine is disengaged and retracted beyond the gate of the valve. The valve is closed and the machine is removed.



**Figure 3.9: Drilling SAJ pipeline using Hot Tapping Machines**

When tap is complete, close control valve, and disengage clutch. Close tapping valve to prevent water from leaking out. The coupon is retained by using a wired pilot drill. The wire on the pilot toggles, thus catching the coupon and preventing it from falling off. Make sure the coupon is successfully removed from the pipeline to avoid clogging the piping system. The sample will be submitted to the SAJ as evidence that the pipeline was successfully drilled without any problems. The pipeline will then be divided into two parts, for domestic and hydrant use.



**Figure 3.10: SAJ pipeline steel coupon**



**Figure 3.11: Sluice Valve fully installation**



**Figure 3.12: Water Meter (blue) & Hydrant Meter (red)**

### 3.2.3 Installation two type of pipe for cold water supply

#### I. HDPE Polyethylene pipe



**Figure 3.13: HDPE Polyethylene pipe**

HDPE Polyethylene pipe is used to supply clean water to the buildings. The initial process of installing this pipe was to excavate the soil 300 mm from the surfaces as it was commonly used for planting this pipe. Several areas have been identified for excavation work. The excavation work was carried out in two ways either by using a backhoe machine or by manpower.

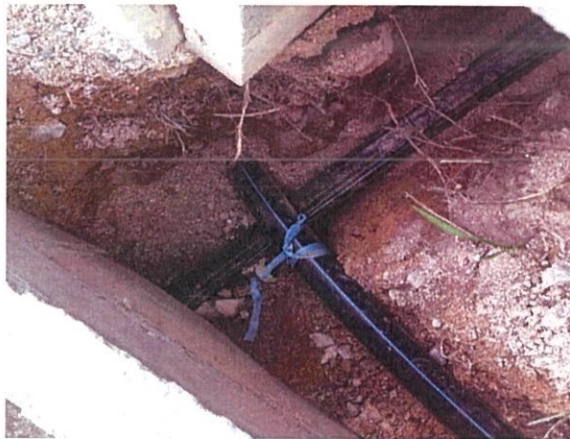


**Figure 3.14: HDPE pipeline excavation**



**Figure 3.15: HDPE Polyethylene pipe installation**

Upon completion of the excavation work, HDPE pipe will be installed underground. Make sure the diameter of the pipe passage has a gap between the sides of the pipe so that the pipe is easy to insert and the empty space is easy to backfilled. Some types of pipe fitting will be installed depending on the suitability of the area and the selection of the appropriate fitting. Some threaded pipe parts must be threaded with thread seal tape to prevent water inside the pipe from flowing out and causing water pressure to decrease and water cannot be efficiently transmitted. Thread seal tape is wrapped around the threads, lubricating the connection and allowing the two pieces to be screwed deeper together.



**Figure 3.16: HDPE Polyethylene pipe**



**Figure 3.17: HDPE Polyethylene pipe fitting**

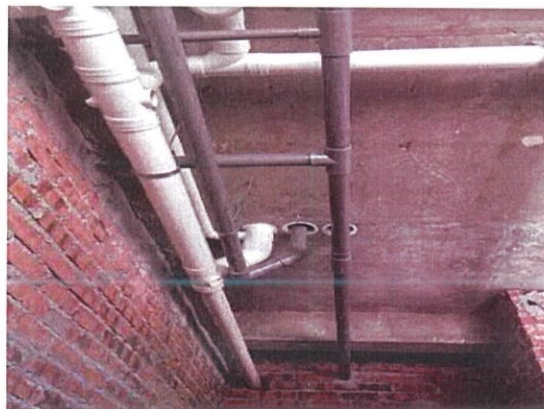
Once the pipe and fittings are completed, water will be channelled through the pipe and a pressure test will be performed to detect if any parts

are leaking. Upon inspection the pipe will be backfilled with crushed run and sand.



**Figure 3.18: HDPE pipe backfilled with crushed run and sand**

HDPE polyethylene pipe is used to supply clean water for use in buildings for everyday use. 100 mm diameter of polyethylene pipe is poured directly into the building to fill the main tank above the building. From these tanks, smaller pipes are used to supply water throughout the building to every level and space. The smaller pipe diameter will be used to produce high water pressure as more water is required to flow to each room.



**Figure 3.19: Internal cold water supply**

## II. MSCL Pipe



**Figure 3.20: MSCL Pipe**

MSCL pipe is installed on the exterior of the building for the purpose of hydrant pillar for emergency purpose. This pipe is separated from domestic pipe so that the water pressure inside the pipe can be maintained and does not decrease when it is used in case of emergency. The initial step for this installation is that the MSCL pipe should be located on the path where the pipe will be installed. The aim is to make the installation process easier and more efficient.



**Figure 3.21: MSCL pipe installation process**

The MSCL pipe bracket will be mounted around the pipe to prevent any movement. The welding machine will be used to attach each end of the pipe to the other pipe. Each joint will place a steel collar so that the joint is

stronger and not easily separated in the event of a strong force hit on that part. Some types of steel fittings will also be installed depending on the suitability of the area and the selection of the appropriate fitting. Connected pipe sections will be painted to prevent them from rusting in the long term period. Once the entire pipe has been properly fitted, a pressure test will be performed on the pipe to test the pressure levels the pipe can bear and to detect any leakage.



**Figure 3.22: Jointing of MSCL pipe fitting**



**Figure 3.23: MSCL fitting**






**Figure 3.24: Steel bracket installation**





MSCL pipe is used to channel water throughout the exterior of the building where it acts as a water supply in case of fire or emergency outside the building. A 4 inches diameter pipe is used to provide enough water in case of emergency. At the end of this pipe, a hydrant pillar will be installed for use by firefighters in compliance with fire safety standards.





**Table 3.1: Equipment for Hot Tapping operation**

Equipment's	Figure
<p>1. Backhoe machine</p> <ul style="list-style-type: none"><li>• Excavated the ground for dredging purposes</li></ul>	
<p>2. Hot tapping</p> <ul style="list-style-type: none"><li>• Making a connection to existing piping or pressure vessels without the interrupting or emptying of that section of pipe or vessel.</li></ul>	
<p>3. Welding machine</p> <ul style="list-style-type: none"><li>• Combine two metals or alloy together using other metal components as fillers</li></ul>	

**Table 3.2: Equipment for HDPE Polyethylene pipe installation**

Equipment's	Figure
<p>1. Backhoe machine</p> <ul style="list-style-type: none"><li>• Excavated the ground for dredging purposes</li></ul>	
<p>2. Hoe</p> <ul style="list-style-type: none"><li>• Digging or levelling the soil</li></ul>	
<p>3. Steel hacksaw</p> <ul style="list-style-type: none"><li>• Cutting steel component</li></ul>	
<p>4. Threaded sealing tape</p> <ul style="list-style-type: none"><li>• Used in plumbing for sealing pipe threads</li></ul>	

**Table 3.3: Equipment for MSCL pipe installation**

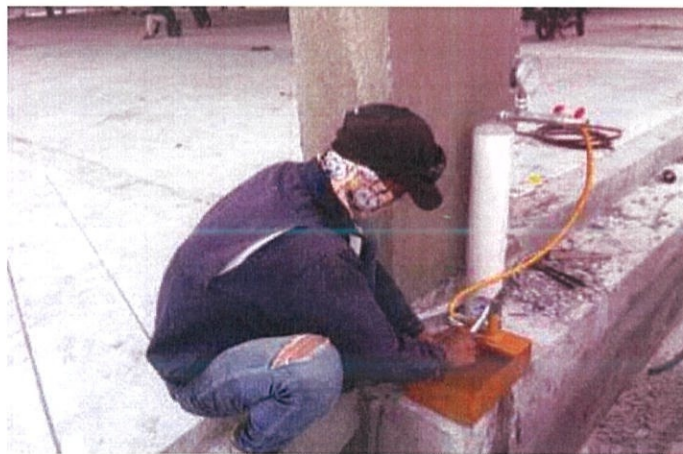
Equipment's	Figure
<p>1. Welding machine</p> <ul style="list-style-type: none"><li>• Combine two metals or alloy together using other metal components as fillers</li></ul>	
<p>2. Grinder machine</p> <ul style="list-style-type: none"><li>• Grinding work pieces</li></ul>	

### **3.3 Testing method for external water supply to ensure adequate water pressure throughout the building and construction area.**

Both HDPE and MSCL pipe types will be tested after the entire pipe has been properly installed. It will be tested using the same method for both types of pipe. The purpose of the test is to make sure the pipe is able to withstand some huge amount of water pressure in the pipe and to detect if the components are leaking at certain parts. This test is also conducted to ensure that the tool can be used for a long term periods. This test is called the Water Pressure Test where high water pressure is applied to the pipe. The pressure test will be run for a period of 24 hours and repeated three times.

#### **3.3.1 HDPE Polyethylene pipe water pressure test**

The water outlet located on the HDPE pipe will be used to test the water pressure inside the pipe. Pressure gauge was fitted to the water outlet located on the HDPE pipe and threaded sealing tape was used to prevent leakage during the installation. Then water pressure hand pump will be installed at the water outlet located on the pressure gauge which means that the pressure gauge acts as a connector between the water outlet and the water pressure hand pump.



**Figure 3.25: HDPE pipe water pressure test**

The water will then be pumped into the HDPE pipe until the pressure gauge shows a reading of 90 psi, which is a commonly used pressure test for a pipeline installation. The test will be repeated three times, in which per test takes 24 hours

testing periods and to make sure that the pipe be able to withstand the high pressure inside the pipe.

### 3.3.2 MSCL pipe water pressure test


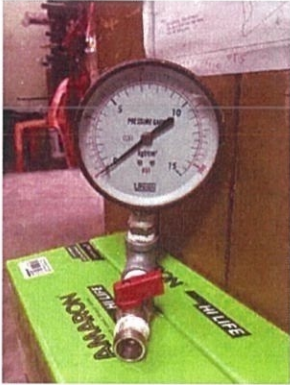
Pressure test will be performed on one of the pillar hydrants located at each outlet of the hydrant pipeline. Pressure gauge was fitted to the water outlet located on the pillar hydrant outlet and threaded sealing tape was used to prevent leakage during the installation. Then gasoline power spray pump will be installed at the water outlet located on the pressure gauge which means that the pressure gauge acts as a connector between the water outlet and the gasoline power spray pump.

The galvanized stock tank is filled with a certain quantity of water and the water is then transferred to a gasoline pump for transmission into the MSCL pipe. Water is pumped into the pipe to increase pressure until the pressure gauge shows a reading of 90 psi. The test will be repeated three times, in which per test takes 24 hours testing periods and to make sure that the pipe be able to withstand the high pressure inside the pipe.



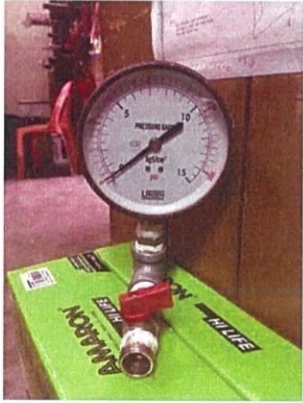


**Figure 3.26: MSCL pipe water pressure test**

**Table 3.4: Equipment for HDPE pipe water pressure test**

Equipment's	Figure
<p>1. Water pressure hand pump</p> <ul style="list-style-type: none"><li>• Provides water pressure in a pipe</li></ul>	
<p>2. Pressure gauge</p> <ul style="list-style-type: none"><li>• Measuring water pressure</li></ul>	

**Table 3.5: Equipment for MSCL pipe water pressure test**

Equipment's	Figure
<p>1. Gasoline power spray pump</p> <ul style="list-style-type: none"><li>• Provides water pressure in a pipe</li></ul>	
<p>2. Galvanized stock tank</p> <ul style="list-style-type: none"><li>• Fill the water in large quantities</li></ul>	
<p>3. Pressure gauge</p> <ul style="list-style-type: none"><li>• Measuring water pressure</li></ul>	

## CHAPTER 4.0

### CONCLUSIONS

Cold water supply is one of the essential components in the construction of a building that is used for residential or commercial use. Water supply is divided into two parts, namely direct water supply and indirect water supply has its own functions and uses. Clean water supply should be installed in the early stages of construction of a building when it is under construction. This is due to the work involving the use of cement requires water for concrete mixing purposes. All pipe installation work must be carried out properly to ensure good installation quality because if that goal is not achieved, various problems will occur in the future. After the installation of the piping system, some tests and pipe inspections should be performed to ensure that the installation does not have any problems. However, periodic servicing is required to ensure that the pipe components are functioning properly and in optimal condition.

To ensure that all pipe components do not have problems like leaking, the water pressure test will be repeated several times so that there is no possibility of pipe leaks. In addition, during the pipe installation process the workers will be monitored to ensure that the installation is done with the strength needed to withstand high water pressure inside the pipe. If one of the key components of the external cold water supply is damaged, the water supply in the building will be affected and there will be a continuous water disruption if the damage to the external piping system is not repaired immediately. Therefore, good cold water supply is very important in supplying clean water for outdoor and indoor use because almost daily life requires water for daily activities.



## REFERENCES

### Book:

R. H. Garrett, Eng Tech, Mip RP. (2000). Hot and Cold Water Supply. Blackwell Science Ltd, Australia.

### Website:

The Process Piping. (2019). *Introduction to Hot Tapping in Piping - The Process Piping*. Available from: <https://www.theprocesspiping.com/introduction-to-hot-tapping-in-piping>

Hottap.com. (2019). *Hot Tap Services 1/2-96" Branch Connections*. [online] Available from: <https://www.hottap.com/pipeline-hot-tapping-services.php>

Sunypoly.edu. (2019). [online] Available from: <https://sunypoly.edu/sites/default/files/Research/Contractor%20Forms%20and%20Training/CFM-00015%20R2%20Procedure%20for%20Performing%20Hot%20Taps>