UNIVERSITI TEKNOLOGI MARA

CENTRE OF STUDIES FOR BUILDING SURVEYING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA SERI ISKANDAR CAMPUS

BACHELOR OF BUILDING SURVEYING

(AP229)

CONVENTIONAL FOR DRAINAGE INSTALLATION SYSTEM AT UMT EDUCATION COMPLEX PROJECT

MUHAMAD QADRI HIDAYAT BIN ABDUL KAHAR

(2018424054)

PRACTICAL TRAINING REPORT

OCTOBER 2021 - JANUARY 202

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JANUARY 2022

This practical training report is fulfilment of the practical training course.

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This is a great treasure I will cherish in my future and career with a worth learning. I would like to this opportunity to express my immense gratitude to all those who have given their invaluable support and assistance to complete industrial practical training.

First of all, I would like to thank to God of Almighty for giving me the strength and good health along the journey of completing industrial practical training.

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Next, I would like to give out a big thank you to my lecturer, Puan Noorazlina binti Kamarulzaman who guide and helps me and my friends a lot during my internship. She always supports and give advices in completing this industrial practical training.

Last but not least, my sincere thanks to all friends and family who advised and lend me a hand along the way to finish this task. They always support me either directly or indirectly in completing this report.

LIST OF FIGURE

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The title of this project is 'Conventional for Drainage Installation System at UMT Education Complex Project, Campus Bukit Kor, Lot 61108, Mukim Rusila, Daerah Marang, Terengganu Darul Iman'. This project is carried out on an area with base area of 600.70 acre (243.10 hectares). The terrain of the site area is hilly and also have lowlands and valleys area. The highest point of the project area is 120.19 meters and the lowest point is 3.90 meters from sea level. UMT Campus Bukit Kor located at Marang district, about 6 kilometers from city of Marang and 20 kilometers from city of Kuala Terengganu.

This project is constructed by the main contractor, Sulong Engineering Sdn. Bhd. It consists of 4 level admin block, 1 level of college block and other support blocks with works around the building. Towards sustainable development, 1/3 from site area will be used for construction of UMT Campus Bukit Kor and the remaining 2/3 of site area will be maintained naturally. In a nutshell, this project consists of construction of buildings and infrastructures.

1.2 COMPANY BACKGROUND

Figure 1: Company Logo

Sulong Engineering Sdn Bhd (SESB) is a Bumiputera company with 100% Bumiputera equity. A company registered with "Pusat Khidmat Kontraktor (PKK)" class (A) for Building and Civil Works, PKK class (I) for Electrical Works as well as CIDB for a G7 class Civil and Mechanical and Electrical Contractor. Initiated by Dato' Haji Sulong bin Haji Mamat in 1973 under the name Syarikat Sulong Letrik the business started for electrical maintenance and installations works.

As the business grows, on 19th November 1983 Syarikat Sulong Letrik was incorporated to be known as Sulong Electric & Engineering Sdn. Bhd. It was now has changed its name to Sulong Enginering Sdn Bhd effective from 7th June 1999. With its blend experience, technical expertise and skills, SESB coordinated its activities into an integrated approach to various Electrical Services, Oil & Gas Industries, Transmission Lines & Underground Cabling Works, Civil Engineering, Buildings, Mechanical and other specialize Civil and Electrical Engineering works.

SESB today has established itself as a leading Electrical Contractor in Malaysia and has the potential to be one of the leading contractors for civil construction works in Malaysia

1.3 Location

Sulong Engineering Sdn Bhd is located at Bangunan SEDC, 102 – F, Jalan Hiliran, Kuala Terengganu, 20300, Kuala Terengganu.

Figure 2: Company Location

1.4 Office and Site Picture

Figure 4: Main Office

Figure 3:Site Office

Figure 5: Administration Building

Figure 6: College Building

1.5 Organization Structure

1.5.1 Board of Directors

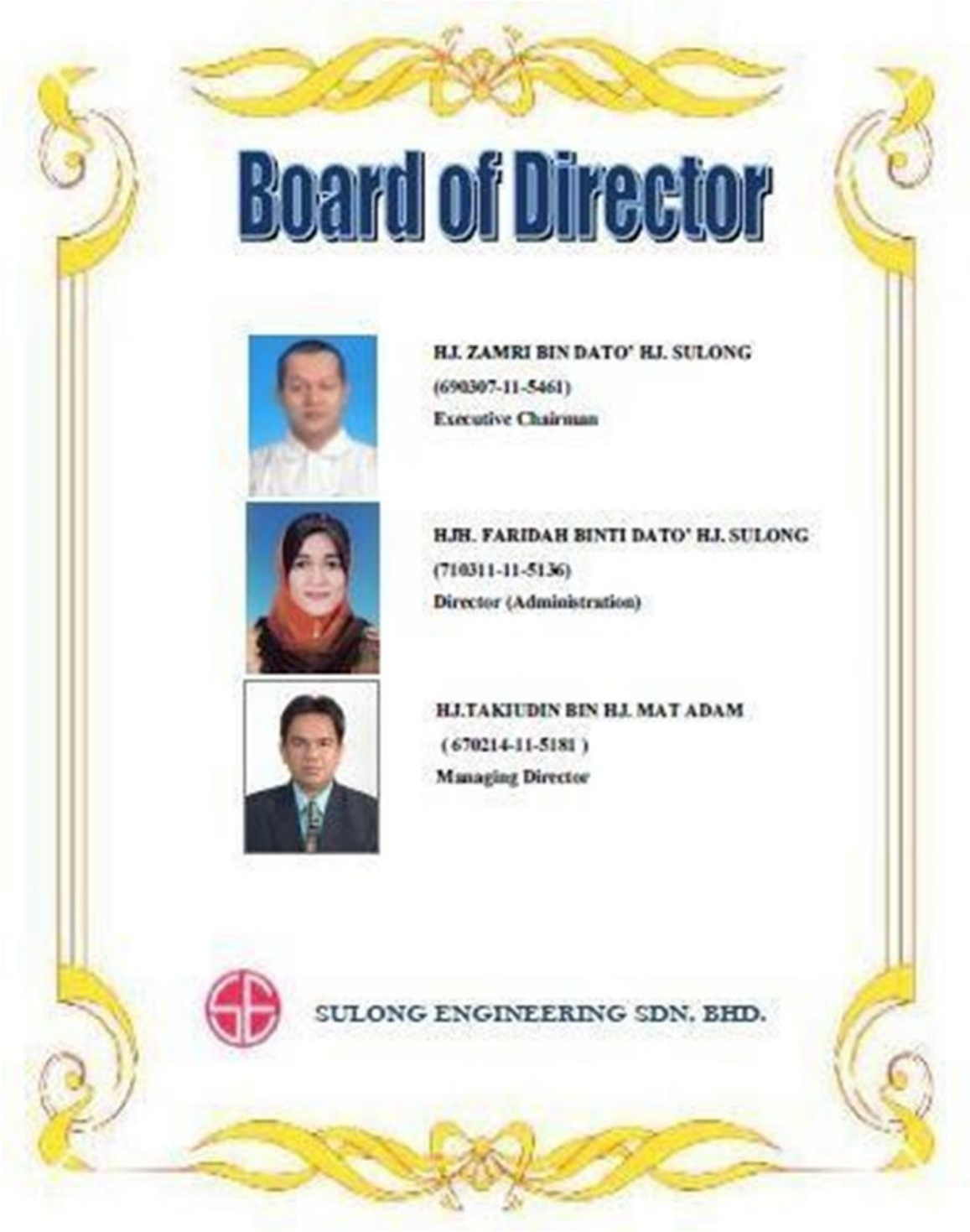

Figure 7: Board of Director

1.5.2 Company Organization Chart

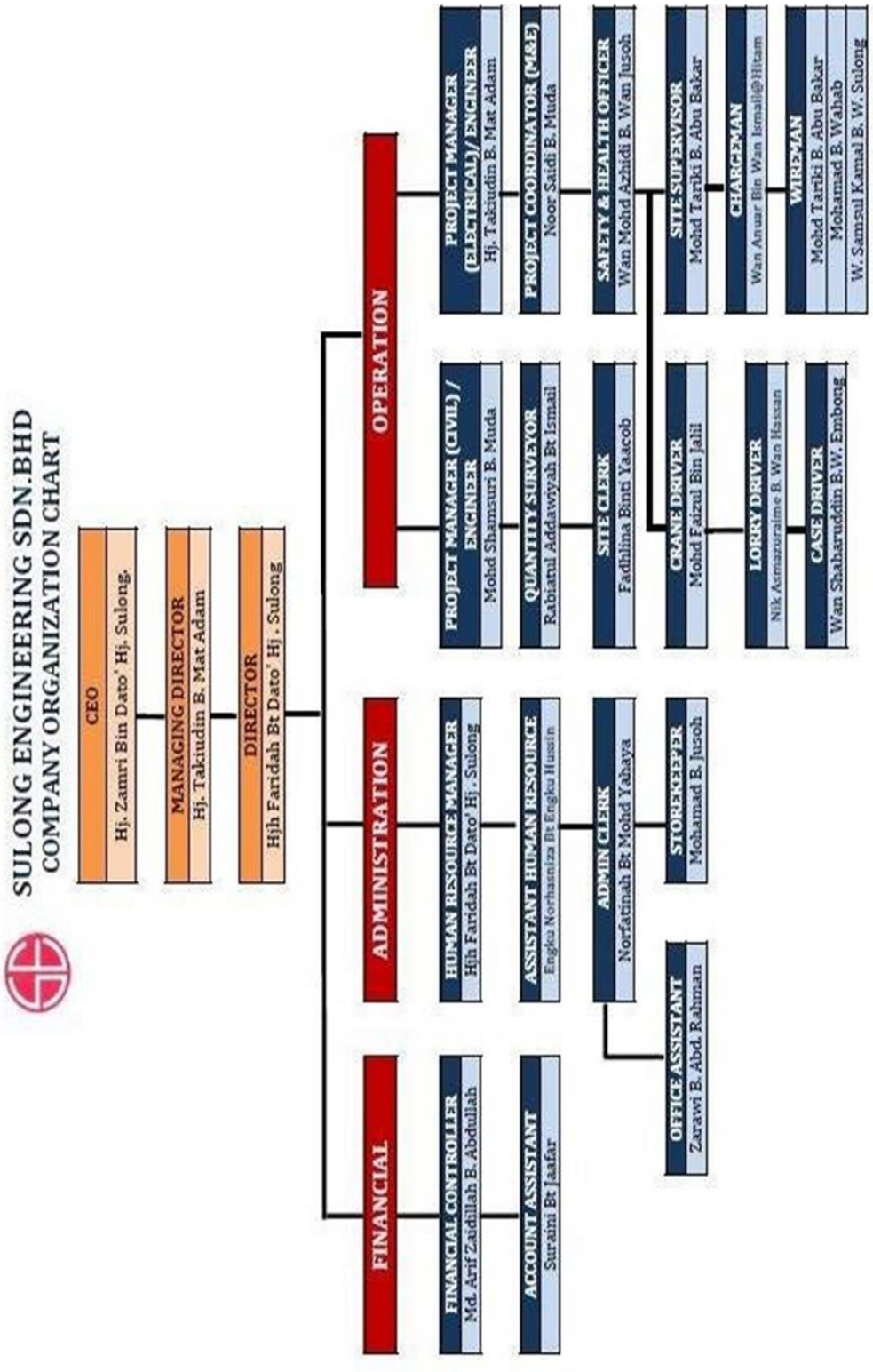

Figure 8: Organization Chart

1.5.3 Direction of the Organization

MISSION

Becoming a better contractor for all events

CORE VALUES

Openness

We have mutual respects for one another, appreciate differences and embrace challenges under one leadership

Teamwork

We work together effectively to achieve shared goals

Honest

We uphold trust and integrity at all times

Excellence

We do the right things are right way, always

Responsibility

We always act with sensitivity and stand accountable for all of our actions and outcomes

1.6 SCOPE OF WORK

1.6.1 Working Hours

The working hours for the internship students at Sulong Engineering Sdn Bhd is on Saturday until Thursday. The internship student need to work from 8.00 am until 5.00 pm. Every day the students need to scan the thumbprint to sign the attendance.

1.6.2 Summary Industrial Training Activities

For my training in Sulong Engineering Sdn Bhd, I was assigned to do my internship at site office and site construction of the UMT Education Complex project supervised by Mr Zulhaniff Bin Wan Zamri. Mr Zulhaniff is the Project Manager here and he gives me a proper works throughout my internship period.

At the beginning of my internship, I was given the project's plan layout and the project background information in order to get the idea about the project first. I studied the plan and identify the characteristics of the building and other related works. After that, I entered the project's construction site every day to observe the progress work commence on site. In order to get the clearer picture of the site, I labelled few things on the layout plan such as the location of brick walls, lightweight blocks and the height of ceilings for every rooms and floors for both buildings, which is Academic Block and Admin Block. This will make me easier to compare design on the drawing and on site.

My job as an intern is to observe and update progress work by taking picture or inform if anything happened on-site and send it into WhatsApp group so that staff can always know what happened inside the construction site. This is to ensure the project is finished within the given time, which is at the middle of 2022. I also do the job given by Mr Zulhaniff such as helping Site Supervisor in supervise work, helping general worker in their work and etc. Most of my time is in the construction site. I also study and double check the quantity taking off for materials such as bricks, tiles, lightweight blocks and many more. This is to make sure every order batch is followed based on Bill of Quantity provided. Last but not least, I used software like Microsoft Excel and Microsoft Word a lot during this internship period which encourage me to apply what I learn in class to real job later. I learn more thing when I do the observation at the site.

CHAPTER 2: DRAINAGE SYSTEM

2.1 Definition of Drainage

Drainage is the method of removing surface or sub-surface water from a given area. Drainage systems include all of the piping within a private or public property that conveys sewage, rainwater, and other liquid waste to a point of disposal. The main objective of a drainage system is to collect and remove waste matter systematically to maintain healthy conditions in a building. Drainage systems are designed to dispose of wastewater as quickly as possible and should prevent gases from sewers and septic tanks from entering residential areas.

2.2 Type of Drainage System

1. Surface drainage system

- Surface drainage systems use channels or ditches to remove surplus water from the land's surface. The ground surface is sometimes shaped or sloped to induce sloping toward the channels
- Open drains, humps, and hollows, levees, and grassed waterways are examples of surface drainage system. A cast-in-place trench drain is a perfect example of a surface drainage system.

2. Subsurface drainage system

- Underneath the top layer of soil, subsurface drainage systems are installed. They act the root level to eliminate excess water and are sometimes referred to as a French drain. Dig ditches to install the pipes of subsurface drains.

3. Slope drainage system

- Slope drainage systems are designed to allow water to flow downward from a structure. It is accomplished with the use of pipes that move down the slope. Since the installed pipe is anchored to an incline, it guides the water through the pipe to get it swiftly away from the structure.

4. Downspouts and gutter systems

- The first line of defence against storm water oversaturation is downspouts and gutter systems. They are usually drained into an aluminium extension, a buried drainpipe, a rain barrel, or another container. The goal is to divert water away from the street or sidewalk and into other drainage systems. Gutter drains or “underground drains” are sometimes used to link them to an underground sewer system.

2.3 The Rules and Requirements That Need to Be Considered in The Installation of Drains

1. Gradient - Drains should be given a gradient so that the movement of water is not so slow and clogged.
2. Depth - Underground drains must be planted to a sufficient depth to prevent the occurrence of leaking or broken pipes caused by the load on it. Example: vehicle.
3. Ventilation - Ventilation should be provided to avoid unpleasant odors
4. Cover - Should be provided to block foul odors into the building as well as not obstruct the passage
5. Paths - Special paths/rooms must be provided for the purpose of inspection or cleaning if drains are blocked.
6. Materials - Materials must be durable and not easily broken. This is to ensure that pipes and drains are durable and able to withstand loads and tension.
7. Connections - Connections should be made to prevent leaks or cracks in the drain.
8. Retainer - To ensure that the drain placement is supported and not easily broken.
9. Size and volume of load - Should be according to the type or shape of the drain.

2.4 Drainage Installation Process

1. Construction of precast U-shape drain

- Setting out / pegging for drainage line will be established by surveyor.
- Excavation for surface drainage will then be carried out to the specified dimensions as per construction drawing.
- The precast U-shape drain shall be in lengths true to shape, sizes and dimensions as per the drawing.
- The drain will then be laid on compacted sand to the proper falls and joined straight true to lines and levels. The joints shall be cement grouted.

2. Construction of in-situ V-shape drain

- Setting out / pegging for drainage line will be established by surveyor.

- Excavation work will be carry out in V shape trench to a depth of 300mm with sides 300mm width based on the construction drawing.

- Then, lay fabric reinforcement in single layer on the excavated area.
- Lastly, place the concrete and rough trowel finish.

CHAPTER 3: CONVENTIONAL FOR DRAINAGE INSTALLATION SYSTEM AT UMT EDUCATION COMPLEX PROJECT

3.1 Introduction of Project

Based on this UMT project, there are few drainage systems used to facilitate the area which is the surface drainage system, subsurface drainage system and downspouts and gutter systems. Below are the types of drain constructed on site:

- Precast U-shape drain
- In-situ V-shape drain
- Ecology drain

A piping system is an assembly of various components put together with a proper method of joints, functionally to transport fluid from its source to destination. The different components put together are defined as piping components. A piping system is a network of pipes, fittings and valves intended to perform a specific job such as to carry or transfer fluids from one equipment to another. The type of drainage pipe used in this project is:

- Polyvinyl Chloride (PVC) pipes
- Mild Steel Concrete Lining (MSCL) pipes
- Vitrified Clay Pipe (VCP) pipes

3.2 Scope of works

1. Ensure the construction of drain are carried out with proper plan and supervised by the site supervisor.
2. Ensure all drain construction follows the specifications that has been stated in the construction drawing prepared by the consultant.
3. Inspection by the engineer is carried out in order to check the quality and sizes of precast drain before it is install in the excavated area.
4. Identify the correct types of pipes used for the construction of piping system based on the design plan.

Figure 11: Drain Installation

Figure 10: Eco Drain

Figure 12: In-Situ V-Shape Drain

Figure 9: Pre-Cast U-Shape Drain

3.3 Drain Installation Process

3.3.1 Precast U-shape drain

1. Setting out / Pegging for drainage line shall be established by surveyor.
2. Excavation for surface drainage shall be carried out to the dimensions of 700mm (w) x 900mm depth.
3. The precast U-drain shall be in 600mm lengths true to shape, sizes and dimensions as per the drawing
4. The drain shall be laid on 100mm thick compacted sands to the proper falls and joined straight true to lines and levels. The joints shall be cement grouted.
5. RC coping of 100mm the x 150mm (w) complete with all necessary reinforcement tied to starter bar, formwork and placing in with G30 concrete.

3.3.2 Ecology drain

Start excavate the drain to install type A eco drain.

Levelling the flow of the drain.

Start filling the river sand as a base and compact it.

Apply the geotextile to separate the sand and soil after soil filling. Also, to avoid sand and soil get into eco drain and can cause clogged

Close the eco drain with geotextile and tied up using stapler.

After that apply the type A eco drain above the geotextile.

Eco drain is ready to close with sand and topsoil

Sand Filling

3.3.3 In-situ V-shape drain

After close up by sand and soil. The surface of the drain will shape to be v shape drain.

3.4 Sewerage Treatment Plant (STP)

Sewerage treatment plant is a type of wastewater treatment that removes impurities from sewage to generate an effluent appropriate for disposal to the environment or intended reuse, preventing water contamination from raw sewage discharges. Sewage is made up of wastewater from homes and businesses, as well as perhaps pretreated industrial waste. There are numerous sewage treatment processes from which to choose. These can range from decentralized systems (including on-site treatment systems) to large centralized systems involving a network of pipes and pump stations (called sewerage) which convey the sewage to a treatment plant.

The general goal of sewage treatment is to generate an effluent that can be discharged to the environment with little water pollution, or an effluent that can be reused in a useful manner. This is achieved by removing contaminants from the sewage. It is a form of waste management. For this UMT project, there will be construction of sewerage treatment plant which will treat the wastewater and preventing the water contamination.

Materials

1. FRP Tank model EA system
2. Raw Sewage Pump
3. Transfer Pump
4. Submersible Mixer
5. Air Blower Motor
6. Control Panel
7. Installation accessories (Drop in Anchor Hook, Wire Strap, O Clip, Bolt and Nut)

3.4.1 Construction Procedure

1. Preparation works

- Work area shall be pegged to lines based on General Survey as shown in the Issued for Construction (IFC) drawing or approved relevant shop drawings.
- Once alignment pegging is established, the pegs shall be marked to indicate relative elevation / level.
- Physical work shall commence only upon SC approval of the Method Statement.
- All access (ingress and egress) is to be determined prior any work commencement.
- Depth of the inlet pipe to the system is identified and to be confirmed accurate by all relevant parties involved.
- Stockpile area for excavated soil is being pre-determined for dumping.

2. Excavation works

- Piloting works shall take place (if necessary) prior to any excavation works
- Excavation works shall be carried out by using excavator
- Open cut method is to be adopted every excavation works

3. Concreting works

- All concrete shall be vibrated by mechanical vibrator. Once excavation work reaches the required level, 50mm lean concrete grade G15N shall be laid with accordance to approved shop drawing to provide a better workability area.
- Reinforcement bar shall be placed on the lean concrete as per approved shop drawing
- Formwork to be installed accordingly
- Mould oil coating shall be applied on the formwork surface to ensure a smooth concrete finish
- Sufficient concrete cover to be provided as stated in approved shop drawing

- Prior to any concreting works, inspection by Inspector of Work is required to verify all the works are as per drawing
- G30N concrete shall be utilized as per stated in drawing
- Method of concrete placement is as per below, subject to site condition
    - Direct discharge
    - By crane
    - By excavator
- Inspection by PDP / SC shall be carried out once formwork dismantled
- Rectification works need to be carried out on any defected structural member such as honeycomb, segregation

4. Curing works

- Curing activities shall be commenced after the concrete structure has set
- Concrete surface shall be cure either as follows
    - Applying approved curing compound (Estop)
    - Covering the surface with hessian cloth (gunnies sack) and constantly wetting the cloth
- Backfilling works shall commence upon the verification of the compacted structure

3.4.2 Installation / Tank Positioning

- When the foundation slab is ready, mark out position of each tank before lowering the tank in position by using a suitable and approved crane.
- Anchor straps are applied over each tank with adjustable bottle screw slip for anchorage against vertical and horizontal movement.
- After the tank is placed in its location, fill in ¾ of the water to prevent any up- lift due to buoyancy from the underground water.
- 1st stage of backfilling
    - Backfilling and compact in layers, clean and suitable material (earth or sand) shall be used for backfilling and care must be taken to prevent soil from over spilling into tank.
- Piping Works (into Tank & Air Delivery Pipe)

- Lay and joint all piping in accordance with standard code of practice.
- All internal piping shall be UPVC type provided with joints.
- Locate the position of stiffener for retaining wall around the tank (if needed) and cast before brickwork. Construct Discharge Manhole
- Construct the discharge manhole and connect the discharge pipe for Clarifier Tank to the manhole as per drawing.

- 2nd Stage of backfilling
  - Level up to final finishing levels, cart away excess excavates and turf to complete.

3.4.3 Sequential Chart of Installation and Construction of STP

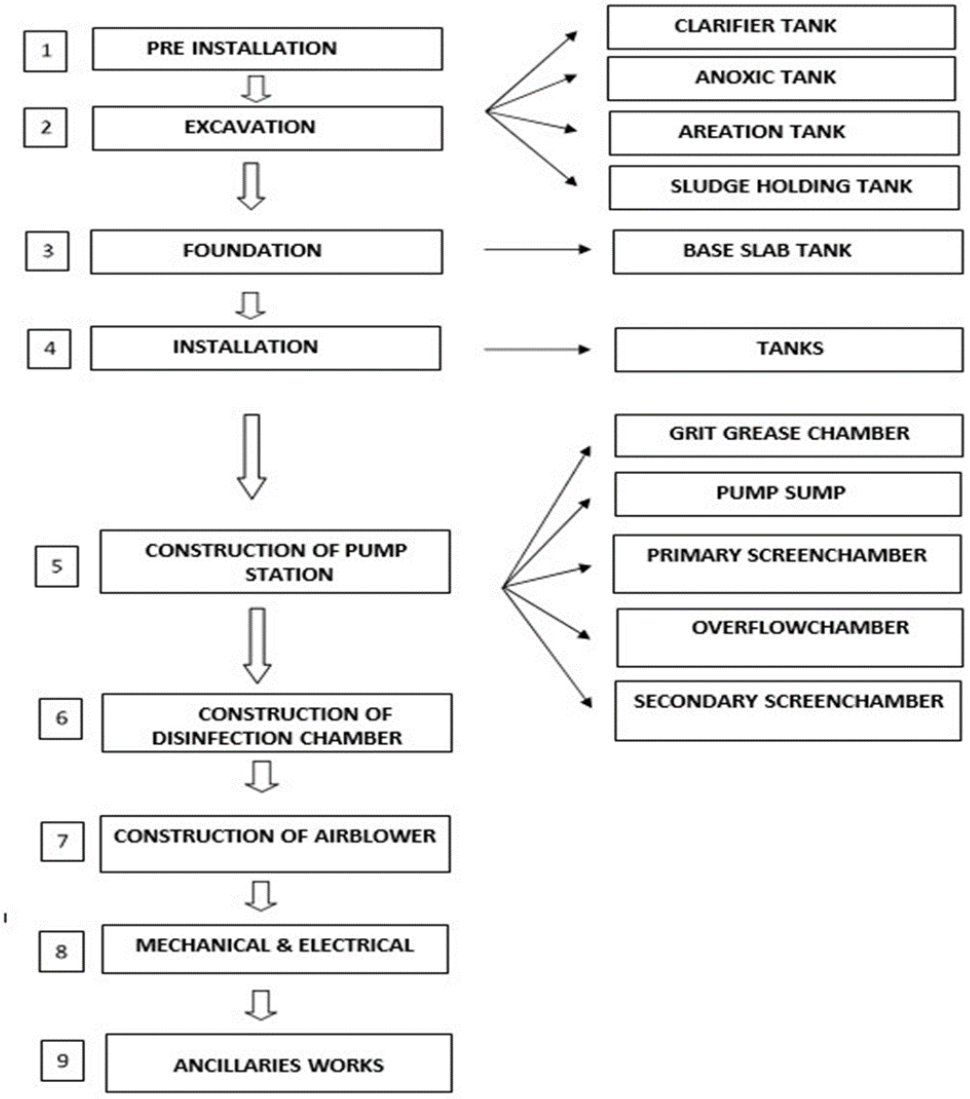

Figure 13: Manhole Installation

Figure 14: Excavation Work on STP

Figure 15: Tank Installation

CHAPTER 4: ISSUE AND PROBLEM

4.1 Issue and problem

The issue and problem for the drain system is the growth of trees in the drain trough. This is caused by stagnant water in the drain. Water stagnates in the drain due to the drain coming down due to soil subsidence. Soil from the foot of the hill that falls together with rainwater into the drain also causes the drain to become clogged and creates the occurrence of tree growth in the drain.

Figure 16: Clogged Drain With Soil

Figure 17: Plant Growth Inside Drain

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Recommendation

In my opinion, the soil in the slope area should be compacted and planted turfing grass so that the soil is not eroded during heavy rains. The condition of the drain that is not the same level needs to be re -measured by the surveyor and the drain needs to be re -installed so that the flowing water does not stagnate in the middle of the drain channel.

5.2 Conclusion

In conclusion, drains are very important to facilitate water distribution. Therefore, drain care should be done regularly so that there is no unnecessary tree growth. Maintenance work needs to be done periodically.

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APPENDICES