



DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

RETAINING WALL CONSTRUCTION

(GABION WALL)

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(PERAK)

10 January 2022

It is recommended that the report of this practical training provided

By

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RETAINING WALL
(GABION WALL)

Be accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

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DEPARTMENT OF BUILDING

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Aked Selasih Corporation Sdn. Bhd. for duration 20 weeks starting from 23 August 2021 and ended on 7 January 2022. It is submitted as one of the prerequisite requirements of BGN 310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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Muhamad Nukman Nadir Bin Zolkapli

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DATE: 10 Jan., 22

ACKNOWLEDGEMENT

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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 Pn Wan Nordiana Binti Wan Ali, Supervising Lecturer, Puan Nurhasyimah Binti Ahmad Zamri, Evaluation Lecturer, En. Muhammad Naim Bin. Mahyuddin, Practical Training Coordinator and Dr. Dzulkarnaean 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

Walls are one of the most important structure elements of a building. A wall plays several functions in the performance of a house and these functions need to be fully understood in order to create suitable and comfortable building as well as providing privacy also as protection from weather. This report will discuss about gabion wall work for the retaining wall of the building. This report was conducted for The Construction is Projek Menggantikan Jambatan Baru RC B149/000/80 Melintasi Sungai Kundang Di Jalan Kundang B149, Daerah Gombak , Selangor Darul Ehsan. The objective of this report is to analyze the construction of retaining wall and the way how it carried out. It will focus on the whole process of retaining wall (gabion wall) construction. It also investigate the equipment and machinery in the methods of gabion wall construction and to determine the time that have been used for the construction. This report will also look to at the advantages and disadvantages in wall construction that would fulfil the criteria of gabion wall.

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CHAPTER 1.0

INTRODUCTION

1.1 BACKGROUND OF STUDY

Gabions were modified and patented by Gaetano Maccaferri in the late 19th century in Sacerno, Emilia Romagna, for use in civil engineering to maintain shorelines, stream banks, and slopes against erosion. Retaining walls, noise barriers, temporary flood walls, silt filtering from runoff, tiny or temporary/permanent dams, river training, or channel lining are some of the other applications. They can be used to direct flood water flow around a vulnerable structure.

On small streams, gabions are also employed as fish screens. Gabion stepped weirs are extensively used for river training and flood control; the stepped design improves the rate of energy dissipation in the channel and is especially well suited to gabion stepped weir construction.

A gabion wall is a type of retaining wall made up of piled stone-filled gabions that are connected by wire. Rather than being built vertically, gabion walls are battered (angled back towards the slope) or stepped back with the slope.

Gabions' lifespan is determined by the wire's lifespan rather than the contents of the basket. When the wire breaks, the structure will collapse. The most common

wire is galvanised steel, but PVC-coated and stainless steel wire are also used. The lifespan of PVC-coated galvanised gabions is anticipated to be 60 years. Some gabion producers offer a 50-year structural guarantee.

Gabion use in streams began in the United States with work completed between 1957 and 1965 on the North River in Virginia and the Zealand River in New Hampshire.

On the two US Forest Service locations, more than 150 grade-control structures, bank revetments, and channel deflectors were built. Due to eroding and a lack of structural integrity in the baskets, a major number of the in-stream constructions eventually disintegrated. Corrosion and abrasion of wires caused by bedload movement, in particular, weakened the structures, causing them to sag and collapse into the channels.

Other gabions were pushed into river channels when trees grew and expanded on top of gabion revetments, pushing them toward the river. Gabions have also been employed in construction, such as the Herzog & de Meuron-designed Dominus Winery in Napa Valley, California, which was completed between 1995 and 1997. The building's façade is composed of modular wire mesh gabions incorporating locally mined stone; this design allows for air circulation and maintains a comfortable temperature within.

1.2 OBJECTIVE OF THE STUDY

There are several objectives have been developed from this construction as follow;

- i. To identify the methods of gabion wall process
- ii. To determine the time of gabion wall process
- iii. To identify the Advantages and Disadvantages in wall construction

1.3 SCOPE OF STUDY

The scope of study has been carried out at Jambatan Kundang and located at Kundang, Rawang, Daerah Gombak, Selangor Darul Ehsan. The project had started in 19 July 2017 and will be expected completed on 19 July 2022. The construction is a construction of Bridge and cost Eleven Million Ringgit Malaysia (RM 11,000,000.00). The project is currently on going. Therefore, the focus of the study is to determine on how the wall construction process for retaining wall is undertaken. Hence, the study will be explained not only about the method of retaining wall gabion wall process but including the advantages of stretcher bond in the construction, finishes for the wall, as well as machinery and tools. Furthermore, the advantages and disadvantages also included in this study. Even so, the study do not concentrate on the quantity of manpower or labors, the costs and the duration matters. In order to fulfill the data, there were three methods need to be carried out which is observation, interview, and document reviews. In conclusion, all further explanation relating the above method were explained as below.

1.4 METHODS OF STUDY

1. Observation

Observation is a method of gathering facts through observation. The observation is about the gabion wall construction process, starting with the laying out the site and ending with the adding layers. The typical time required for this observation is around 2-3 hours, although this is simply for the laying out the site process, which is dependent on the length of the wall. The cage process takes longer to complete the longer the wall is. The cut cage operation took one hour in total. Meanwhile, it took 1 hour to put up the cage of the wall since it demands ability and must be done properly, particularly at the filling parts. This meant that the entire adding layers for the walls took about 3 to 4 days. The progress of wall construction was documented with a smartphone and some notes over the course of 10 weeks.

2. Interview

The interview is one of the method to collect the construction data by doing the structured or semi structured interview with the trusted person for the project. The have been done while doing the observation and while doing the work at the site. The interview was conducted with the construction manager, the contractor who is responsible for handling the project while at the construction site. This interview was also done to the workers who were at the construction site while doing filling basket works. Semistructured interviews were also conducted with the contractor responsible for conducting the project each week in the office and usually carried out around 10 – 15 minutes. The semi-structured interview recorded through short notes.

3. Document Review

The documents review that have been used to collect all the data for the construction is company profile, construction drawing, standard operating procedures (SOP), progress report and the pictures that taken by other workers. Drawing plan will be used as the reference at the site that under monitoring for brickwork process. The pictures that belongs to others also the best reference during the document reviews.

The time for document reviews will usually take 30 minutes for one drawing plan in a week. This document reviews placed at the office.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Aked Selasih Corporation Sdn Bhd, (ASCSB) is a Bumiputera status private limited company incorporated on 11 August 1997. ASCSB is wholly owned and managed by a young group of enthusiastic and highly capable Bumiputera professionals with vast experience in the construction industry. Aked Selasih Corporation Sdn Bhd, (ASCSB) has involved its services provisions into other supporting project requirement such as crane works, lifting services and erection services and other complex and tedious works that can be managed by ASCSB The company started off as part of an extension of a professional practice offering professional construction consultancy services to developers and contractors alike. It then started its own construction division and has since been actively involved in various types of construction in both government and private sectors ranging from;

- Building Works, namely Low and High Rise, Residential, Commercial, Schools, Hospital and works alike as well as assembling of infrastructure.

- Civil Engineering Works, namely Earthworks, Roadwork, Drainage, Bridges, Landscaping such as Soft scape & Hardscape and Water Supply and Sewerage.

- Mechanical, Electrical and Related Oil and Gas Works Installation and Maintenance Services.

A Associated Supplier of Scaffolding and Accessories to the construction industry in a long/short period of time.

Manpower Supply and manage for construction & engineering industries.

Fiber Optic Solution, providing fiber optic solution and capable of design, install and maintain Fiber Optic Cabling and solution.

Coal Mining & Trading, providing best service with the standard requirement & performance in any project in minerals resources i.e, Steam Coal Trading and Supplier to the international Market

2.2 Company Profile



Figure 2.2.1 Aked Selasih Corporation Sdn Bhd HQ

Name of Company : AKED SELASIH CORPORATION SDN BHD

Company No. : 442383-V

Type of Company : PRIVATE LIMITED

Country of Incorporation : MALAYSIA

Date of Incorporation : 11 August 1997

Registered Office : B-3-2A, BLOK B, OSTIA BANGI BUSINESS AVENUE,

JALAN OSTIA 1, SEKSYEN 14,

43650 BANDAR BARU BANGI, SELANGOR.

Business Office : NO.82A, JALAN RENANG 13/26,

SEKSYEN 13 40100 SHAH ALAM,

SELANGOR.

Tel : 03 5511 4366

Fax : 03 5511 1366

Authorized Capital : RM 5,000,000.00

Paid up Capital : RM 5,000,000.00

Company Secretary : SKA SEKRETARIS SDN. BHD.

Auditors : AZMI ISMAIL & CO.

2.3 Organization Chart

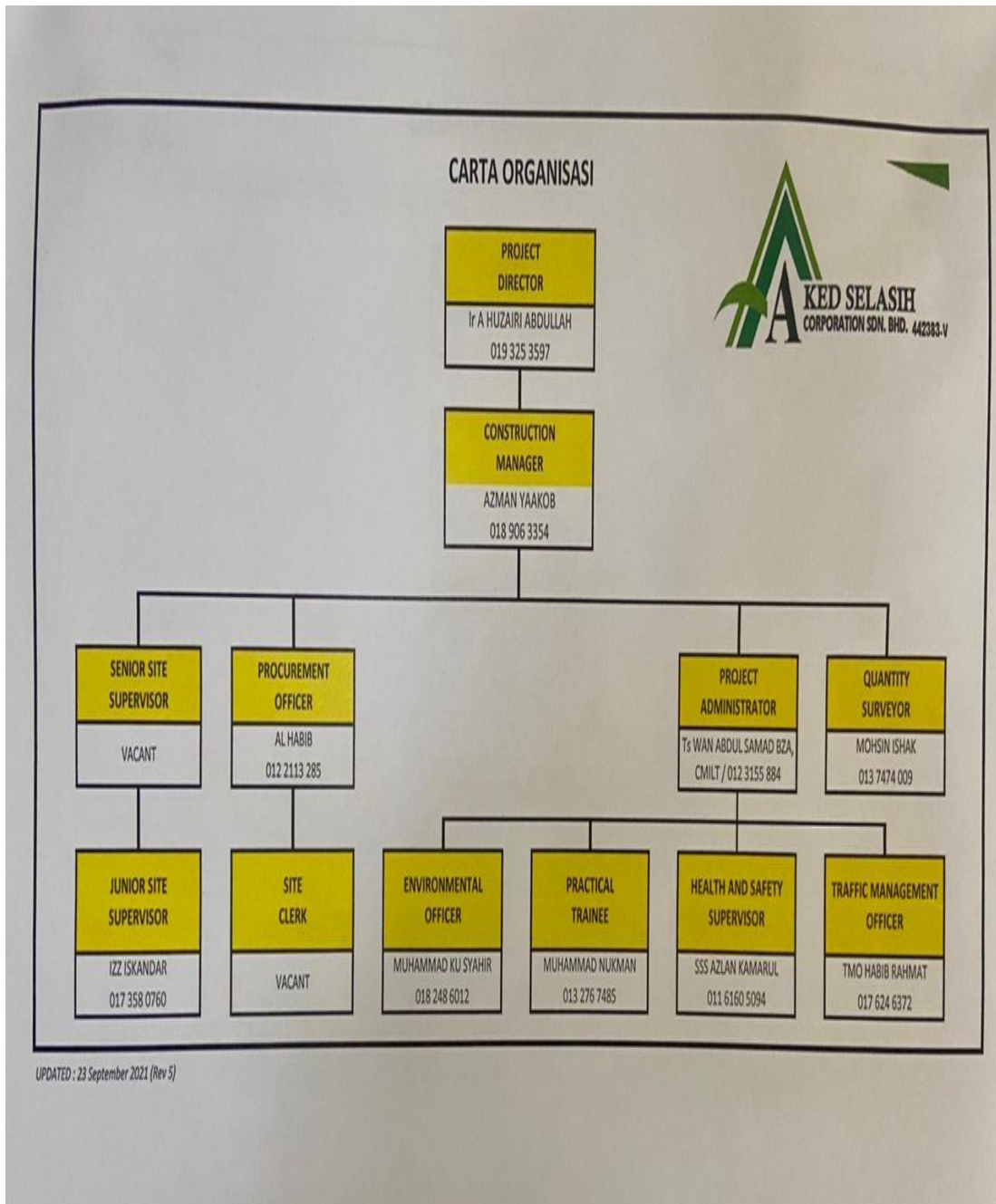


Figure 2.3.1 Site Organization Chart

2.4 List of Project

2.4.1 Completed Project

LIST OF PROJECTS					
NO	JOB SPECIFICATION	AWARDED BY	DATE AWARDED	STATUS	VALUE (RM)
1	STACKABLE TYRE STORAGE RACK	SHAPADU TRANS-SYSTEM SDN BHD	10/05/1999	COMPLETED	45,000.00
2	STACKABLE TYRE STORAGE RACK	SHAPADU TRANS-SYSTEM SDN BHD	20/05/1999	COMPLETED	75,000.00
3	STACKABLE TYRE STORAGE RACK	SHAPADU TRANS-SYSTEM SDN BHD	01/06/1999	COMPLETED	75,000.00
4	CONSTRUCTION FENCING UNDER BRIDGE 10	(ELITE) EXPRESSWAY LINGKARAN TENGAH SDN BHD	10/06/1999	COMPLETED	82,250.00
5	MEMBEKAL DAN MEMASANG KELENGKAPAN PERABOT DI KOMPLEKS BELIA BANDARAYA, KM 6, JALAN IKAN YU, CHERAS, K.LUMPUR	N & NDECOR (M) SDN BHD	10/02/2000	COMPLETED	388,660.00
6	TO RELOCATE EXISTING CHAIN LINK FENCE INCLUDING POST TO MATCH ROW BOUNDARY AND TO CONSTRUCT NEW 1.5 M HIGH CHAIN LINK FENCE WITH POST	ELITE	12/04/2000	COMPLETED	73,600.00
7	KERJA-KERJA MEMBINA PAGAR TAMAN DAGANG AMPANG, SELANGOR	SYARIKAT PERNIAGAAN AZREEN	12/04/2000	COMPLETED	41,200.00
8	NORTH-SOUTH EXPRESSWAY CENTRAL LINK AND KLIA EXPRESSWAY CONSTRUCTION OF EART DRAINS FOR SEWERAGE TREATMENT PLANT	ELITE	11/05/2000	COMPLETED	35,000.00
9	CADANGAN MEMBINA 12 UNIT GERAI, BILIK SEMBAHYANG & TANDAS SERTA RUANG MAKAN DI BK4/2A, BANDAR KINRARA, MUKIM & DAERAH PETALING SELANGOR	MPSI	08/09/2000	COMPLETED	941,740.00

Figure 2.4.1.1

NO	JOB SPECIFICATION	AWARDED BY	DATE AWARDED	STATUS	VALUE (RM)
10	SUPPLY & INSTALLATION OF MS HANDRAILING WORKS FOR 6 STOREYS LOW COST FLAT (TANJIUNG 6) AT SECT.6, SG.BULOH, SELANGOR	SIC	10/10/2000	COMPLETED	34,193.00
11	KERJA-KERJA PEMASANGAN JUBIN DI KAUNTER PEMBAYARAN DI JABATAN PERBANDARAN	MPSJ	30/11/2000	COMPLETED	18,960.00
12	ERODED EARTH DRAIN	ELITE	15/12/2000	COMPLETED	20,000.00
13	RECTIFICATION OF ERODED DRAIN SURFACE	ELITE	15/12/2000	COMPLETED	20,000.00
14	CADANGAN MEMBINA DAN MENYIAPKAN MASJID BARU DI BANDAR SUNWAY, DAERAH PETALING, SELANGOR	METROWEALTH CONSTRUCTION SDN BHD	02/04/2001	COMPLETED	40,000.00
15	CADANGAN MEMBINA DAN MENYIAPKAN KERJA-KERJA INFRASTRUKTUR DI SECT. 4, FASA 1, BANDA UTAMA, BATANG KALI, DAERAH ULU SELANGOR, SELANGOR	KUBAH ALAM	10/04/2001	COMPLETED	2,000,000.00
16	CADANGAN UBAHSUAIAN DAN HIASAN DALAMAN BANGUNAN 7 TINGKAT SEDIADA DI NO.24, USJ 9/5T, SUBANG JAYA, SELANGOR	MPSJ	26/04/2011	COMPLETED	630,760.00
17	CADANGAN MEMBINA DAN MENYIAPKAN PAGAR BESI SERTA TIANG KONKRIT DAN LAIN-LAIN KEPERLUAN LANDSKAP DI KAWASAN DE PALMA INN SHAH ALAM, SELANGOR.	PKNS	01/05/2001	COMPLETED	35,000.00
18	KERJA-KERJA MENAIKKAN TARAF JALAN DI KAMPUNG LEMBAH KINRARA, PUCHONG SELANGOR	MPSJ	02/08/2001	COMPLETED	273,000.00

Figure 2.4.1.2

2.4.2 Project in Progress



Figure 2.4.2.1



Figure 2.4.2.2

CHAPTER 3.0

3.1 Introduction to Case Study

The case study is about Retaining wall construction (Gabion wall). The project where has started the construction in 19 July 2017 and predictions will be completed on 19 February 2022. The cost of construction approximately Eleven Million Ringgit Malaysia (11,000,000.00). Currently, the project progress is still on going. Thus, the study will be explained not only regarding installation but including the machinery and tools, the time that have been carry out and the problem and solution of the construction. Nevertheless, the study do not concentrate on cost matters and manpower. The site location took place at the Kundang, Rawang.



Figure 3.1.1

Figure 3.1.2

The project construction located at Jalan Kundang B149, Daerah Gombak, Selangor Darul Ehsan . This construction area is the the main road . The area is quite secluded as it is still surrounded by forests. The main buildings close to this construction area are Palm Oleo Sdn Bhd, the factory. There are several existing housing buildings close to the construction area. There are also existing residential areas near the construction area, namely Kampung Baru Kundang, Apartment Laman Adonis and Danau Sutera Apartment, Maha Templer.

The activities that have been carry out on the site is gabion wall. This uneasy work need to be handle by skilled workers to get a perfect wall bonding. The machineries and tools that involved in this construction are excavator, backhoe, shovel, Combination pliers, Crow bars, Gabion tensioner, Gabion frame, Tensioning frame, Heavy duty hammer, Leather gloves, Stanley knife, Fencing standards. Next, time is very important for the success of a construction.

Last but not least, the advantages and disadvantages of gabion wall process will be determines throughout the construction process. This chapter will be focused on the method of gabion wall, the time that have been use for gabion process and the advantages and disadvantages.

3.2 To Identify Methods of Gabion Wall

STEP 1 - LAYING OUT THE SITE



Figure3.2.1

Begin by levelling the pad in both directions with a string line and line level or a carpenters level installed on a long straight edge (typically 2"x4" - 12' long).

STEP 2 - PROVIDE A FIRM AND LEVEL BASE



Figure 3.2.2

Remove any grass, weeds, or top soil with a hoe or flat shovel. If the earth is hard, your gabion wall may be able to be built immediately on top of it. If have sandy or clay soil, need to replace about 6" of it with compacted gravel or a concrete footer, or the soil may slump. If not going to plant anything on the wall, use brush killer (Round Up) to get rid of any weeds or roots before covering it with geotextile fabric.

STEP 3 - GABION REINFORCEMENT - INSTALL SUPPORT COLUMNS



Figure 3.2.3

The wire of a gabion wall with a narrow width has almost no structural stability. Internal support posts buried in concrete and spaced on approximately 6' centres will be required for these walls.

Typical columns can be lengths of galvanised tubing, pressure-treated wood posts, or structural steel elements, depending on the installation and local standards. Make sure the column is buried 3-4' deep, then add dry mix concrete, wet it up, and return in a day or two to begin the installation.

STEP 4 - ASSEMBLING THE GABION BASKETS



Figure 3.2.4

Begin by unfolding and laying up the wire mesh panels, with the bottom panel sitting flat on the prepared base and the gabion sliding over the interior support posts. A galvanised steel spiral is wound through the neighbouring sides of the mesh panels to hold baskets together. The spiral fits the mesh grid spacing of the gabion, so it's simple to do. Use pliers to secure and prevent the spiral from falling out as it reaches the end.

The most regularly utilised size is 6 feet long baskets. They have a main separating panel that is wired in along its bottom edge when the cage is open on the flat surface, and then down each vertical side after the sides are raised up and the basket is in place, to prevent bulging. Bracing ties are placed and pinched closed across each corner $1/3$ to $2/3$ of the way up the basket, depending on the height of the basket.

STEP 5 - FILLING THE GABION BASKETS



Figure 3.2.5

If have access to local rocks, filling the gabion wall with these materials will result in a gabion wall that blends in with its surroundings. The external rocks put against the exposed faces must be somewhat larger than the mesh openings to prevent spilling. A typical 3" x 3" mesh calls for a minimum of 4" rocks and a maximum of 8". Use jagged rocks to fill in corners, while smaller rocks, used bricks, and concrete components can be introduced in the structure's middle, where they will not be seen when done. Work in stages, filling any spaces with smaller pieces and wedging the best-looking rocks against the basket's face. Fill in behind them to hold them in place, orienting them as precisely as possible.

STEP 6 - ADDING LAYERS



Figure 3.2.6

To achieve fence heights greater than 3', multiple baskets are usually stacked on top of one another. After you've finished packing the lower basket, wire shut the lid and put the second layer on top. Fill the second layer with the best-looking rocks on the face and the less appealing fill rocks in the centre, just like the first.

3.3 To Determine Time of Gabion Wall Process

In contracts, the concept of completion time is crucial. Failure to execute a duty under a contract within the time frame stipulated is normally considered a "material" breach of contract, and the other party may be entitled to damages. If no time constraint is specified, the default attitude is that the allowance must be appropriate, alternatively, in some instances, time is deemed "at large" and irrelevant.

The job has been delayed for a variety of reasons, and it is not necessarily the contractor's responsibility. Nature, for example, can be an unwelcome guest on a construction job, causing delays.

The gabion wall construction of this project was anticipated to take roughly two weeks, but it took about two to three weeks to complete. During the building, natural barriers such as rainy days and the Covid-19 pandemic stymie the progress of the project. These hurdles were the cause of the project's postponement.

The construction of the gabion wall began on August and ended on October 2021. The duration of the gabion wall process was monitored by observation and photographs taken using a smartphone. The Gabion wall was measured using floor and elevation blueprints as a reference during the installation process.

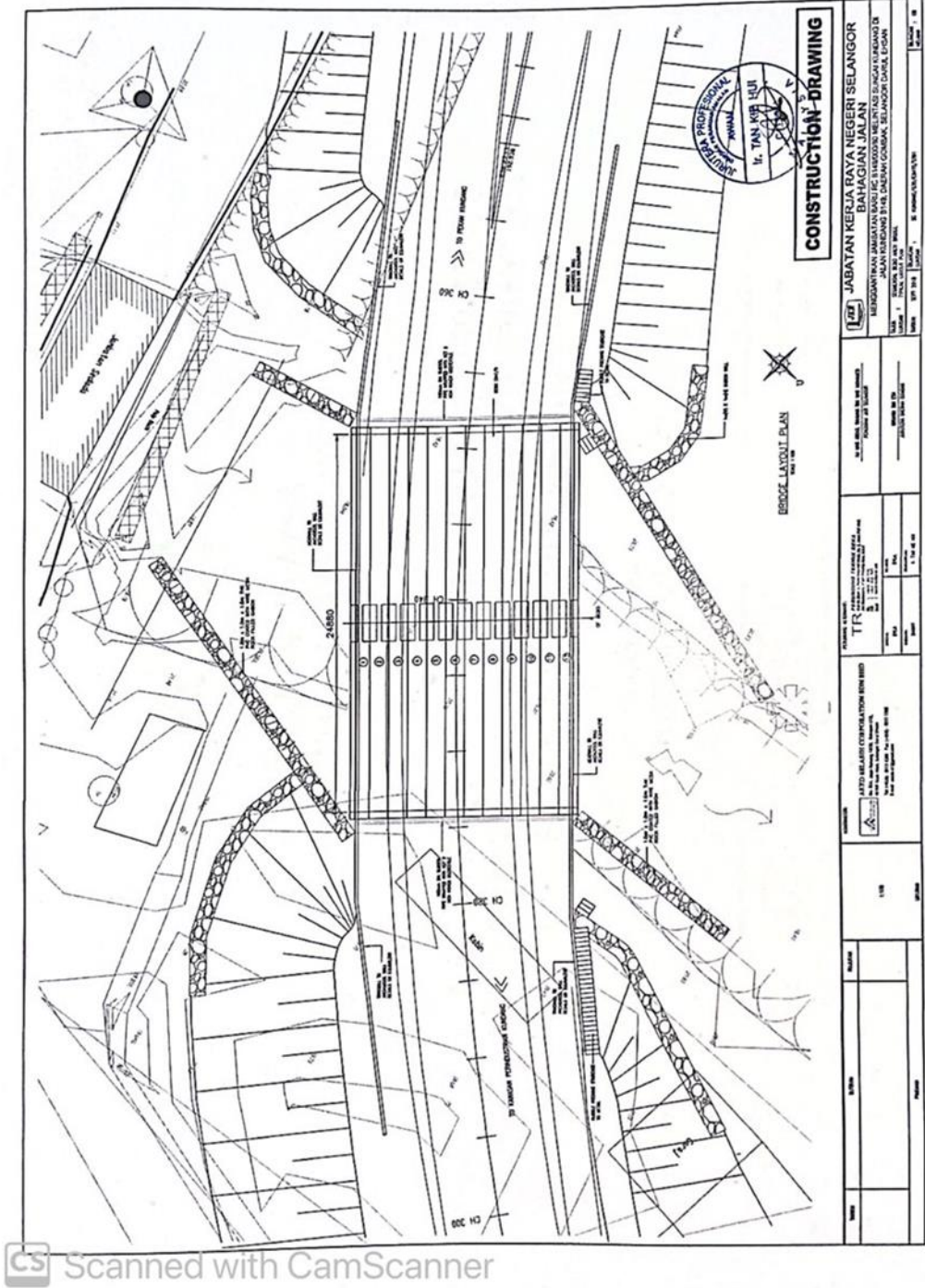


Figure 3.3.1

23 August 2021 – 10 September 2021

Right Hand Side 1 Area – 20 meter length



Figure 3.3.2



Figure 3.3.3

13 September 2021 – 24 September 2021

Right Hand Side 2 Area – The wall not too long to do the wall installation but take times so long because had used underground cable.



Figure 3.3.4



Figure 3.3.5

27 September 2021 – 15 October 2021

Left Hand Side 1 Area -



Figure 3.3.6



Figure 3.3.7

17 October 2021- 29 October 2021

Left Hand Side 2 Area –



Figure 3.3.8



Figure 3.3.9

3.4 To identify the Advantages and Disadvantages in wall construction

3.4.1 Advantages -- Handling and Construction

Gabion wall building components are simple to transport to job sites, unload, and install. The rock fill is available in a variety of sizes and colours to fit the volume and style of each wall, allowing them to be tailored to each application. Gabions can be used to follow a grade along a wall, to build stream bed banks, and to reinforce coastal dunes. Gabion walls' tops can taper to match any change in landscape height. Construction is continuing at a rapid pace.

3.4.2 Advantages – Endurance

Because to the elasticity of their wire mesh design, gabion walls withstand breaking and separation. They can withstand repeated beating from waves and stream flow without disintegrating. Gabion construction uses environmentally friendly gravel and pebbles that can withstand years of deterioration from water erosion. The galvanised wire in the mesh is corrosion and rust resistant.

3.4.3 Advantages – Application

Gabion walls can be used to create pond and dam walls, as well as serve as cladding for structures. Cement caps, similar to the way sidewalks cap the tops of wall structures 2, can be used to cover gabion walls. Gabions can be used to create interconnecting beds, riverbanks, and drainage channels for slope stability. They defend against mud slides and hill slides in areas where the topsoil is unstable and

has no root basis. On beaches and tidal berms, gabion barriers protect against storm surge and wave erosion.

3.4.4 Advantages – Drainage

The permeability of gabion walls remains good due to the pebble and gravel design, allowing sufficient natural drainage of runoff while reducing water velocity by breaking it up and dispersing the pressure over a large region.

3.4.5 Disadvantages – Aesthetics

In river, pond, and beach settings, gabion structures have a reputation for being unattractive and unnatural. Rather than forming natural-looking rock barriers, the front-facing walls appear drab and mechanical in design. Big gabion walls built on tourist beaches serve as a diversion from the need to safeguard large beach areas with particularly thick and lengthy walls.

3.4.6 Disadvantages – Maintenance

The entire wall must be disassembled to reach the affected location if the boulders shift or become worn down inside the metal baskets as a result of heavy water and wave activity. Any damage to the bottom regions of very tall gabion stacks necessitates the removal of the upper wall elevations, which can be costly and time-consuming.

3.4.7 Disadvantages -- Wall Assembly and Cost

Gabion walls are more expensive to erect than natural vegetated slopes or riprap, despite the fact that they are a suitable economic choice for most applications. Because mechanical lifting is required to set massive wall sections in position, gabion walls necessitate the use of heavy equipment.

3.4.8 Disadvantages – Endurance

Gabion wall wire mesh baskets can abrade and tear open in high-velocity streams and wave interaction, spilling the rock fill.

3.4.9 Disadvantages – Inspection

To ensure the integrity of gabion barriers, they must be inspected on a regular basis. They must also be inspected and analysed right away after any storm that results in higher-than-normal water flow.

CHAPTER 4.0

Conclusion

The walls are important to the building to create suitable and safe building as well as providing safety to everyone also as protection from weather. The gabion wall method was started from laying out the site, provide firm and level base, install support columns, assembling the gabion baskets, filling the gabion baskets and adding layers for wall.

The process took around 8 weeks starting from August until October 2020 without wall finishes work. The Gabion wall construction delayed a few days because of the weather and also the movement control order during the pandemic Covid-19. Therefore, it takes more time than the estimated.

The method for gabion install process in the construction are common method and it similar to the theory. There is nothing that carried out differently during the gabion wall construction. In addition, the advantages and disadvantages can be know easily.

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