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FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITY TECHNOLOGY MARA
(PERAK)

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It is recommended that this Report Practical Training

By

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entitle

Drain Closure: Method and Safety Aspects

accepted as partial fulfillment as requirements in obtaining Diploma in Building.

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OCTOBER 2013

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 through practical training practical training that I went through a period of 5 months from 13 may 2013 to September 28 2013 at Teraju Precast Company Sdn Bhd. It is also a requirement to pass the course DBN307 and accepted in partial fulfillment of the requirements for obtaining a Diploma in Building.

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_____ as site supervisor, friends and others
whose names are not included here. May Allah repay all of your good deeds.

Thank you.

ABSTRACT

This report briefly describes the method and safety aspects in drain closure construction using concrete truck (ready-mix concrete method), and is the result based on the experience of 5 months of practical training placed at the construction site located at Kg. Telaga Daing, Kuala Terengganu. This report varies into sections and starts with the company background and the background of the construction project. The project shows that the method and safety aspects of drain closure construction is not as easy as the title stated. This is due to many parties involved in this project. In this report, a detailed explanation about the construction method of drain closure with explained safety aspects during the construction. During the process of construction, some problems are identified and this report also explained the solutions to overcome the problems. As a conclusion, this report contains detailed explanation of the method and safety aspects of constructing drain closure, practically to readers.

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LIST OF ABBREVIATION

CIDB	Construction Industry Development Board
K.Trng.	Kuala Terengganu
Kg.	Kampung
JKR	Jabatan Kerja Raya
RC bars	Reinforcement bars
SSM	Suruhanjaya Syarikat Malaysia
UiTM	Universiti Teknologi Mara
ZBO	Zakaria bin Othman

CHAPTER 1

INTRODUCTION

1.1 Acknowledgement

In this era, the construction industry from all around the world has been through a revolution and revision of technology, including a variety usage of new materials and methods. The use of materials in construction plays an important role in creating other new materials which are cost-efficient and less time taken, while preserving the core function of the application, and this includes the construction of drain closure.

In this case, Malaysia is listed as one of the developing state around the world, trying to improve the usage of more cost-efficient, long-lasting materials and short time of construction works. The implementation of well-known steel drain closure was reduced and thus, giving the way to the more cost-efficient material, which is concrete drain closure. Authors found out that the materials in concrete drain closure has higher weather-resistant and this is very suitable for weather climate in Malaysia.

Hence, the author was placed as practical trainee at the construction project of drain closure during five months of practical training in the company. The company chose to use the ready-mix method of constructing drain closure. Although the method is higher construction cost compared to other methods, but the high quality of concrete and less construction time had ease us with the choice made by the company.

1.2 Objectives of Study

The objectives of this study is to clearly understand the topic stated:-

1. To study the safety aspects during the construction of concrete drain closure.
2. To identify the method of construction in constructing concrete drain closure using ready-mix method.

1.3 Scope of Study

The scope of study for this project is focused on identifying the method of constructing concrete drain closure. For this project, the company prefer the method using concrete-mixer truck than in-situ construction. In general, these two construction method are mostly same, excluding the concrete process in the construction. The in-situ method focused on making concrete at site. Unfortunately, this method consumes more time due to many process involved, such as concrete test and curing process.

The ready-mix method is focusing on using concrete made from the factory. The concrete produced from the factory is high quality and the standard concrete gred used is gred 35. This method uses less time and less manpower is needed. The concrete is transported using concrete-mixer truck, and this decision helps in better quality result of concrete and less time consumption.

The safety aspects that is focused during the drain closure construction are crucial not just for the safety of workers, but also for the construction of drain closure itself. This varies from the safety gears equipped to the safety procedure during the construction process. An example that can be viewed is a worker wearing safety goggles and gloves when cutting the RC bars. This shows that the worker is aware of dangers that would occur if he was not wearing the safety gears stated. Lack of safety awareness not just from the workers, but also from the employer could lead to life-threatening accidents or worse, lead to death.

1.4 Method of Study

The aim of this study is to attain information easily and effectively. The methods used in the study are as follow:-

1. **Observation**

This well-known method is the most effective method in the preparation of this report, and can be examined for clear information about the method and construction process from the beginning to the end of the process.

2. **Experience**

This method is very helpful and easy to understand from the knowledge exposed in the theoretical studies during lecture sessions. The result from the practical training can be applied in preparing this report.

3. **Electronic source**

This is one of the most useful method in finding source and references related to the project. Any source taken is stated after the last word of a sentence.

4. **Interview**

An interview with a well-knowledge person not just can share detailed information and explanation of a process, but also helps in conducting this report.

CHAPTER 1

COMPANY BACKGROUND

2.1 Introduction

The company was established on 12th February 1982 and has been carried out works related to the contract. The company is private company and located at Lot. 29, Jalan Balik Bukit, 20300 Kuala Terengganu.

From the establishment, the company has done many works related to sub-contract and as the main contractor that has been certified and licensed with PKK and 100% locally-owned under G4-class.



Figure 2.1 Official logo of ZBO Protech Resources

This company is well-known as a supplier of building material besides conducting contract works, and has machinery facilities such as backhoe and lorry. On 7th September 2005, the company has established new company under the name of ZBO Protech Resources, with registration number of TR0059371-K. The owner remains unchanged and the company has taken over all administrative and business to this day.

2.2 Company Profile

Name : ZBO Protech Resources

Company Registration No. : TR0059371-K

Mailing Address : 29, Jalan Balik Bukit,
20300, Kuala Terengganu.

Telephone No. : (Office)
(Manager)

Fax No. : 09-624 8362

Date of Registration : 7th September 2005

Registered Wholesalers : 1. TARAF BUMIPUTERA
2. CIDB
3. SSM
4. LESEN KEWANGAN

Status : 100% Locally-owned

Initial Capital : RM 500,000.00

Name of Bank : Hongkong dan Shanghai Bank Malaysia Berhad

- Bank Account No. (Old) :

- Bank Account No. (New):

Company Asset Value : RM 600,000.00

2.3 Organization Chart

The diagram 2.1 below shows the organizational chart of the company. Most company is tree-branch charted, and this company was lead by the same owner of the company, named Zakaria bin Othman. The company is divided by two sections, the technical section and the administration section. The technical section mainly focused on the site works, while the administration section manages administration works at office.

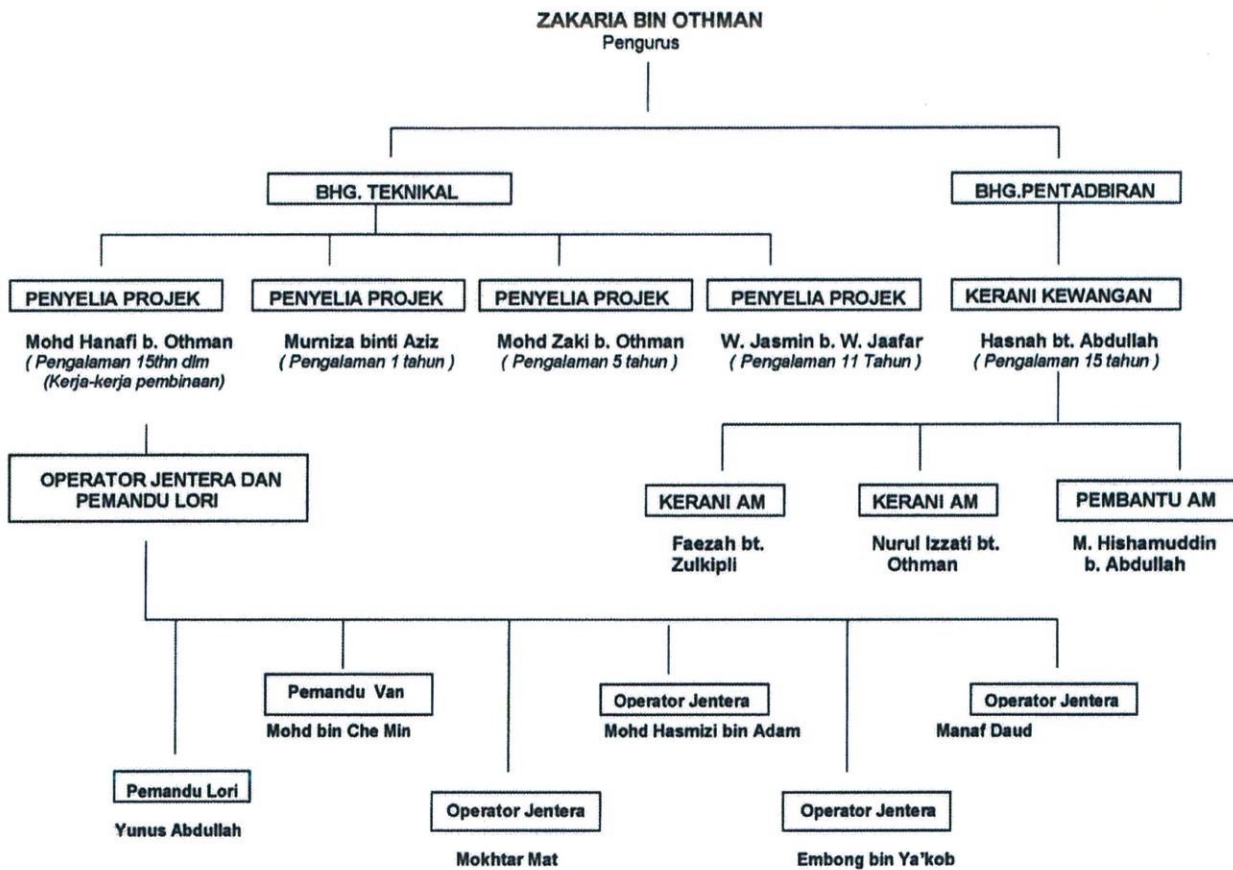


Diagram 2.1 The organizational chart of ZBO Protech Resources

Source: ZBO Protech Resources Company Profile Report

2.4 List of Projects

This shows the list of completed projects and on-going projects.

2.4.1 Completed Projects

The list of completed project varies from year 2008 until 2012.

NO	NAME OF CONTRACT	NAME OF CONSULTANT	NORMAL VALUE (RM)	CONTRACT PERIOD	DATE FINISHED
1	Resurfacing road works in Taman Impian Murni, Bukit Datu, K. Trg.	EDARAN BINA ENTERPRISE	44,410.00	4/7/2008	4/7/2008
2	General maintenance of building and associated works of administrative office in Masjid Hiliran, K. Trg.	PERNIAGAAN USAHA CERGAS (JPP)	35,000.00	19/1/2009 - 16/4/2009	8/4/2009
3	Constructing and upgrading works of drainage system in Taman Desa Kayangan, Batu Rakit, K. Trg.	MAT HASAN YUSOFF (MBKT)	181,925.00	7/4/2010 - 26/5/2010	12/5/2010
4	Constructing of drain gate and related works in Kg. Simpang Tok Ku, Dun Bandar, K. Trg.	INSAN JAYA ENTERPRISE (PDKT)	94,850.00	3/3/2011 - 30/4/2011	15/4/2011
5	Design, construct and completion of road works for 243 storey-house and related works for Low-Cost Houses (RKR) project in Kg. Paya Lawas Mukim Jerangau, Daerah Dungun, Terengganu	MRI CONSTRUCTIONS SDN. BHD.	66,300.00	27/2/2012 – 28/2/2012	28/2/2012

Table 2.1 Table of completed projects from 2008-2012

Source: ZBO Protech Resources Company Profile Report

2.4.2 On-going Project

Table 3.4.2.1 show the list of on-going project, which only focused on the current unfinished project.

NO	NAME OF CONTRACT	NAME OF CONSULTANT	NORMAL VALUE (RM)	CONTRACT PERIOD	DATE FINISHED
1	Design, construct and completion of Multi-purpose Hall in Kg. Seberang Takir, K. Trg.	ZBO PROTECH RESOURCES	200,000.00	13/5/2013 - 30/9/2013	-

Table 2.2 Table of on-going project at Kg. Seberang Takir, K.Trg

Source: ZBO Protech Resources Company Profile Report

CHAPTER 3

CASE OF STUDY

3.1 Introduction

Drain closure is one of the most important element in any drainange system, and is usually located above the drain. It acts not just as a safety feature for people, but also ensures that any unwanted smell from the drain is reduced from moving completely above the surface. There are many types of drain closure used nowadays, such as steel, plastic and concrete drasin closure.

The materials used in creating these drain closure depend on the type of drain closure. For example, the steel drain closure is majorly made of steel, while the plastic drain closure is mainly made of plastic. However, these types are less favorable by most company due to high cost construction, high risk of stealing, and less strength and durability. For the concrete drain closure, it is made of binded reinforcement (RC) bars, hooks and high-grade concrete. Although this cost more than steel and plastic types, but this proves to be the most preferred type by many company due to high strength, durability and weather-resistant.

This project was focused mostly on the method and safety aspect in constructing drain closure, and the company had decided to construct concrete-based drain closure.

3.2 Background of the Project

The construction project of drain closure is located at the residential area in Kg. Telaga Daing, Kuala Terengganu. The exact date of commencement of the project is generally unknown, but some information stated that the project started around 21th June 2013 to 9th July 2013. The estimated cost for this project is approximately RM30,000-RM50,000.



Figure 3.1 The residential area of Kg. Telaga Daing, Kuala Terengganu

The project located is at one-way road of residential area, and from the initial observation, the drainage system along the roadway is mostly exposed. This increases the risk of residents & road users passing through the roadway and with the absence of fences or warning, this could lead to dangers for people nearby.



Figure 3.2 The exposed drain could lead to dangers to people

To avoid unnecessary incident, especially that leads to the life-threatening dangers from occurs, the construction of drain closure is vital for the uncovered drain area. The placement of drain closure not just helps in reducing hazards at the roadway, but also reduces the smell pollution emitted from the exposed drainage and gives comfort to the residents passing through the roadway.



Figure 3.3 Drain closure plays an important role for the safety of road users

3.3 Case of Study

3.3.1 General of Safety in Construction

Safety is one of the major aspect that can acts as a protection guide for people, ensuring that they are free from hazards and dangers in an area. There are many aspects of safety that are proven efficient in informing people at site. People should be aware of the dangers that can harm their lives and this aspect must be well-informed not just for workers and employer, but also for residents and people nearby. People that obey the rules of safety are less vulnerable to dangers when at the construction site and thus, free from dangers that could lead to life-threatening accidents.

3.3.2 Importance of Safety in Construction

Safety plays an important role in avoiding an individual from unnecessary incident that could lead to injuries. Any accident occurred at the site not just slow down the construction progress, but also increases the medical cost or project cost. For this project, some people applied the safety gears when working at site. Unfortunately, there are some workers that lack of awareness of dangers around them during working hours. For this project, some worker wears safety gloves when cutting RC bars. This helps in stronger grip of the RC bars and thus. reduced slippery when holding the bars. A worker was wearing safety boots during concrete works to ease movement and avoid stepped on dangerous objects.

Workers can increase their awareness of dangers before, during, and after construction project if the employer informs them. The common methods used to inform the message are notice of safety and dangers on notice board and through daily meeting with workers. The safety of residents can be assured when employer and workers place warning signboard near the construction area.

3.3.3 Method of Drain Closure Construction

RC bar is one of the important materials in the construction of drain closure, used to increase the tensile strength of concrete structures in a construction. The reinforcement bars needed for this project is approximately 648 bars, as the number of drain closure needed to be constructed is 72. The approximate cost for RC bars is around RM100 per drain closure, so the total cost for all 72 drain closures are estimated around RM7,200.



Figure 3.4 Picture of a binded reinforcement bars

The whole process for the reinforcement bars takes about two days and only requires 2 to 3 workers to get the job done. In order to accomplish the recommendations given, the numbers of reinforcement bars used in one drain closure is 9 (5 bars vertical, 4 bars horizontal) and the steel bars used are high tensile steels, sized Y14. This is suitable for the construction as the higher diameter of reinforcement bars are more difficult to bend, while the lower diameter of the bars are low in strength and not suitable for the roadway drainage.

3.3.3.1 Marking of Reinforcement (RC) Bars

The reinforcement bars provided is 15m length, which are too long to bend and formed. In this case, cutting process is vital in obtaining desired length of reinforcement bars for the drain closure construction. Marking works need to be done in identifying the length needed. The marked bars is placed horizontally to ease the cutting process.



Figure 3.5 Marking process of 15m-long RC bars

This works only requires two worker to do the job efficiently. One worker is assigned to identify the searched length of reinforcement bars, while other worker marks the exact length needed for the construction of drain closure. Measuring tape is used to find the length of desired reinforcement bars, and chalk is used to mark the exact length that needs to be cut.

3.3.3.2 Cutting of RC Bars

The Figure 3.3.3.2.1 below shows the process after marking the reinforcement bars. This is one of the methods that can be used in cutting process. There are three well-known methods in cutting the reinforcement bars, such as cutting using metal cut-off saw, flammable gas, and steel cutter.

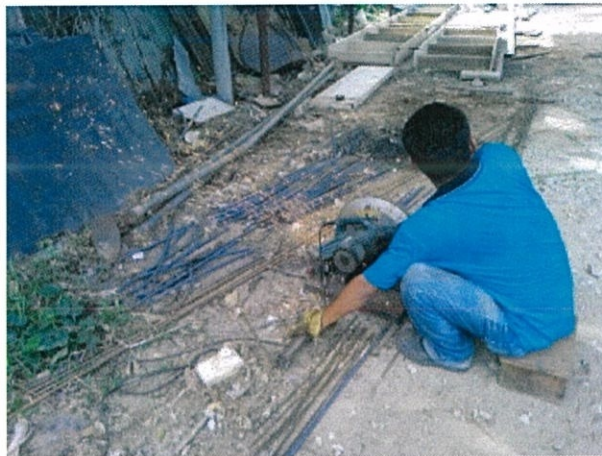


Figure 3.6 Cutting process of RC bars

The Figure 3.3.3.2.1 also shows the worker equipped with a safety gloves, This helps in giving enough grip for the worker to hold steadily the RC bars when cutting process occurred. However, no application of safety goggles during the cutting process is dangerous and could lead to accident such as permanent blind.

Unfortunately, the method used in this project is cutting using metal cut-off saw due to insufficient equipments found at the workshop. Furthermore, cutting using flammable gas is officially prohibited and illegal because the reaction of steel bars occurs when exposed to flames and thus, reducing the standard quality and strength of the bars. The last method is legal and actually one of the old equipments used to reinforcement bars, however the process takes quite a long time and uses many manpower to accomplish the task.

This concludes that the first method, which is cutting using metal cut-off saw is more efficient and energy-saver. The reinforcement bars are gathered and placed near the steel bending workplace for the next process.



Figure 3.7 Placement of RC bars

3.3.3.3 Forming of RC Bars

The steel bending workplace is one of the old method and commonly used to form reinforcement bars. The workplace is actually the formation of self-customized desk, which used to bend steel bars. Some small used steel bars are placed and welded according to the common length of steel bars.



Figure 3.8 The forming process of RC bars

The workplace is not recommended for bending or forming works of steel bars, but the result of the process (long U-shaped bar) is almost identical to the forming works using machinery. This works however, needs high manpower and workers are assigned to bend the steel bars using their own strength. The number of workers needed to get the job done is 2 or 3 workers, and this is one of the most tiresome work in the construction project.

The bending tool used in the forming works is steel bender. It is important to know and use the steel bender suited for the job, as this affects the usage of manpower. As a hypothesis, the longer the steel bender, the lesser force is needed to bend the bars. Luckily, the steel bender used in the workplace is the long one, which reduces the manpower needed to form the steel bars.

3.3.3.4 Binding of RC Bars

After forming the reinforcement bars, the binding process takes place. As stated before, one drain closure consists of 9 reinforcement bars, which are 5 vertical and 4 horizontal bars. The horizontal bars are placed below the vertical bars, and the binding points are determined by the intersections of the steel bars.



Figure 3.9 Picture of binded reinforcement bars

A small length of 2” (5.08cm) from the bended parts are determined in order to locate the best binding spot while maintaining the equivalent length of all the reinforcement bars. Only 1 or 2 workers are needed for the binding process. Steel wires and pliers are used to bind the bars.

There are two types of binding techniques for reinforcement bars, but this project only focused on six-style bindment (*ikat enam*). This is known as the strongest type of binding for the reinforcement bars. This is recommended for the project as the construction only requires simple binding of the steel bars.

The other one, eight-style bindment (*ikat lapan*) is not applicable in this project because the bindment is unnecessary for this kind of project. However, this bindment is really useful in binding reinforcement bars for beam structure.

3.3.3.5 Formwork Construction of Drain Closure

This process focuses on the construction of formwork for the drain closure. Plywoods are one of the most common materials used for the formwork construction. According to the workers, they prefer using plywoods as their construction materials because they are reusable, lightweight, and cost-efficient.



Figure 3.10 Formwork construction using plywoods

The plywoods are gathered and cut according to the size of the drain closure, which are measured 900mm x 900mm x 200mm and this process needs more than 4 workers to complete the given task. A L-shaped ruler plays an important role in making the formwork square (90°). Nails and hammer are used to bind the nails together with the woods. This is due to the less force are needed to make the nails stick together and easy to remove the nails when done.

Any cracks or gap between the formwork is filled with newspaper. This is crucial to prevent concrete from leaking outside the formwork during the concrete works. The process is completed and consumed about one day when all the 72 formworks are constructed.

3.3.3.6 Temporary Placement of RC Bars

The Figure 3.3.3.6.1 above show the temporary placement of binded bars in all the completed formworks. The RC bars are placed according to their placement in the formwork and is important to check whether the formed bars are fitted with the formwork. Fortunately, there are no problems occurred in this process and the placement of all the binded bars are fitted in the formworks.



Figure 3.11 Placement of binded RC bars in formworks

This work requires only 2 workers, and is categorized as one of the easiest work to do. Workers only need to place the binded bars at the middle of the formwork and the job is finished. The simple work does not need many manpower and takes about 5 minutes to place all the binded bars in the formworks.

3.3.3.7 Hook Application at RC Bars

Hooks are binded together with the binded bars as shown above. In this process, one drain closure requires 2 hooks, and both are placed at the middle horizontal ends of the reinforcement bars. This is important in lifting and transporting the hardened drain closure to the site.



Figure 3.12 Hook is applied and binded with the RC bars

Only 2 workers are assigned to do the work, as this does not require many manpower to get the job done. The work is pretty simple and identical to the binding process of reinforcement bars. For the binding method, this process uses eight-style bindment. This ensures that the grip between the hooks and the bars are strong when lifted.



Figure 3.13 Binded hooks with RC bars

The tools used to bind the hooks with the binded bars are steel wires and pliers. Steel wires are used as they are suitable in steel binding works. Besides, the materials also increase the grip and strength of the bindment. Pliers are used in tightening the binding of steel wires and removing any defect steel wires.



Figure 3.14 Picture of tool used for bindment of hooks

The reinforcement bars are then removed from the formworks as the purpose of this process is only to check, not for immediate installation. The permanent placement only occurs during the concrete works. This process is simple and vital in avoiding double-handling works for future process.



Figure 3.15 RC bars are removed from the formwork

3.3.3.8 Moisturizing Process of Formwork

After the removal of RC bars, the process continues with the moisturizing process of formworks. This is done by pouring water in the formworks and only needs one worker to finish the task. Based on my knowledge, this work is not present and lecturers do not included during their lecture session. However, this proved to be one of the most important work in the construction.



Figure 3.16 Formworks are moisturized using water

The purpose of moisturizing the formwork is to keep the formwork wet during the concrete works. This does not effect the concrete hardening process at latter process, but enables to remove or separate the hardened concrete with ease for the last process.



Figure 3.17 Picture of moistured formworks

3.3.3.9 Concrete Process of Drain Closure

This is the most crucial part in the making of drain closure. Concrete is one of the most major parts in construction, and mainly consists of water, cement, sand, and aggregate. The strength of the concrete depends on the grade of the stated materials. For this process, the grade of the concrete are based on the standard stated by JKR (*Jabatan Kerja Raya*), which is Grade 35. As observed, there are no concrete test carried out at site because of the test is already done before concrete is transported to the site.



Figure 3.18 Concrete pouring process is carried out

There are 2 popular methods of making concrete, which are in-situ method and ready mix method. Our company has decided to choose the latter method due to fast construction and great quality. This work requires 3 worker to get the job done, 2 workers in handling the concrete placement in formworks and 1 worker to control and manage the pouring of concrete. The concrete is poured and filled only half (100mm) the formwork to ease the reinforcement bars placement.

The concrete process continues with the placement of reinforcement bars on the lean concrete. The binded bars act as the bone of the concrete structure, and increases the sturdiness and strength of the concrete. One worker is assigned to place the binded reinforcement bars on the concrete poured just now.



Figure 3.19 Application of RC bars on lean concrete

This is a simple work, but requires high precision and accuracy. The bars must be placed at the middle of the concrete and the top edge of the binded bars must be filled with concrete. Any bars appears outside the concrete is not valid to use and luckily, there are no bars appeared during this work.

Next, the concrete is poured until reaches the full level (200mm) of the formwork. This work is basically same with the lean concrete pouring, but this is done after placing the bars in the formwork. The number of workers to do the job remains the same, which is 2 workers.



Figure 3.20 Formwork is fully filled with concrete

Some workers wear safety boots during the work not just to protect themselves from any dangerous or pointy materials, but also to ease the workers' movement in the concrete. Shovels are used to control and manage the concrete placement in the formwork. The final result of the concrete pouring is the rough surface concrete with air gap. The next process discusses the solution of the air gap in the concrete.

3.3.3.10 Vibration Process of Drain Closure

For this section, the concrete is not in the best condition. This is because there are many hollows or air gaps inside the concrete and the problem needs to be solved immediately before the concrete hardened. The only solution is by doing the vibration works in the formwork.

The vibration process enables the concrete to fill in any air gaps inside it and thus, making the concrete compact and solid. Unfortunately, there are no safety gears equipped at the worker. The well-known equipment used for this work is a vibrator, which vibrates the content in the formwork. Only one worker is assigned to do this job, and the process takes about 1 minute for each concrete formwork.



Figure 3.21 Vibration process of the concrete

3.3.3.11 Plastering Process of Drain Closure

The Figure 3.3.11.1 shows the common works for most concrete project, whis is the plastering work for the concrete. The fresh concrete needs to be shaped and smoothen to attain solid and sturdy surface. The time needed to completely smoothen all the concrete surface is approximately 80 minutes.

The worker for the job is the same worker that was assigned for the compression work. Only one tool is used for the task, which is a float. This tool has flat, rectangular-shaped and acts as surface smoothing not just for the wall plastering work, but also for this concrete work.



Figure 3.22 Plastering works on the concrete surface

3.3.3.12 Drying Process of Drain Closure

This is the last process for the concrete work, which is the drying process. This process can only begin when all the concrete in the formworks have been vibrated and smoothen. In this process, it does not requires any manpower or tools, only time and weather play their role in concrete hardening process. The hardening process takes about 7 days.



Figure 3.23 Concrete is dried for a week

After a week passed by, the concrete in the formworks are hard and sturdy. This proves that the strength of the concrete increases gradually, even only for 7 days. The dried concrete should be able to withstand heavy load and strong weather conditions, and able to be used to cover the drain. The next process explained about the disassemblment of the concrete from the formworks.



Figure 3.24 Concrete is hard and sturdy after hardening process

3.3.3.13 Disassemblment of Formwork



Figure 3.25 Removal of formwork from the drain closure

The disassemblment works are not difficult to be done thanks to the water used to moisturize the surface of formworks. Two workers are listed to do the job and the tools used in formworks removal from the concrete, only hammers are used in removing the nails from the formwork. The hammers are also used to force the formwork to be separated from the concrete. The whole process consumes about 1 minute 15 seconds per drain closure.



Figure 3.26 Lifting works for the separation of formwork underneath

For the final works, the drain closure must be fully separated from the formworks. This includes the formworks underneath the concrete. For this work, a forklifter is assigned to solve the stated problem. Forklift is used to temporarily lift the drain closure, and then placed to the original location of the drain closure.

CHAPTER 4

RECOMMENDATIONS AND CONCLUSION

4.1 Recommendations

4.1.1 Insufficient equipments and tools

One of the difficulties occurred during the construction works of drain closure is the insufficient of the tools and equipments provided at the workshop. Workers are unable to do their works properly when some specific equipments are crucial. An example to visualize this problem is the lack of equipment for forming the steel bars. This leads to slow construction process or worse, could lead to extension of time of the project.

As a solution for this problem, workers are assigned to use their own strength to form the steel bars. This work requires a lot of stamina and needs more than one worker to get the job done and right on schedule. Although this method is considered as one of the most tiring work, but this method proved to be useful during emergencies.

4.1.2 Lack of concern of safety during working hours

This proved to be one of the most hazardous parts during the construction works. This is pointed at some workers who does not wear safety shoes and gloves. One of the examples that can be seen is during the steel bending works. The other example is during the wetting process of the formwork. Although the safety gloves and boots are provided by the company, the stated actions show that the workers does not prioritize their safety when working.

This lack of concern about safety could lead to life-threatening accidents or worse, leads to death. Fortunately, there are no accidents occurred during the construction works. Even so, this does not mean that workers can continue working with their lives are at higher risk compared to workers wearing safety gears. Employer should also play the role of holding a meeting focusing on the safety during working hours.

4.2 Conclusion

In a nutshell, drain closure is proven to be one of the important elements in drainage system. The method and process of constructing them were difficult, and these need to be done as soon as possible. Any delay for this project could increase the risks and hazards to all road users when passing through. The choice of using ready-mix concrete was right, and the company managed to get the work done with the best result of the drain closure. Although there are some minor difficulties such as low manpower, this problem can be solved with the help from other workers. These workers are from the road construction project, but employer has decided to ask for their help to accomplished this project.

Safety aspects play a significant role in making sure that any person follows the rules and aware of the dangers that could befall them. Workers must wear safety gears such as goggles and safety helmets at the site to increase protection against unwanted accidents such as permanent blind and damage to their head. Employer should focused more on the availability of safety gears and increase the workers' awareness on the safety aspects when working at site. Notice sign of a project should be placed near the site to inform people of the place is under construction.

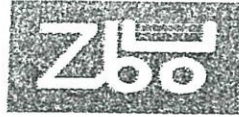
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BR, Teresa, Krystle, Eric and 4 others. How to Tie Rebar. Retrieved from <http://www.wikihow.com/Tie-Rebar>

2. ZBO Protech Resources Profile Company



ZBO PROTECH RESOURCES

29, Jalan Balik Bukit,
20300 Kuala Terengganu.

ZAKARIA BIN OTHMAN

Managing Director

Tel :

Fax :

H/p :

Email :

*Konfraktor Binaan, Jalan, Kerja Tanah,
Kerja-kerja Kejuruteraan Besi,
Pembakal Bahan Binaan Dan Sewa Lori*

PROFIL SYARIKAT

MAN OTHMAN
ZAKARIA BIN
PROTECH
RESOURCES



No. Siri TB 126295

PUSAT KHIDMAT KONTRAKTOR
KEMENTERIAN KERJA RAYA MALAYSIA

SIJIL KONTRAKTOR KERJA ✓
TARAF BUMIPUTERA

Adalah dengan ini syarikat tuan seperti tercatat di dalam Sijil ini diiktiraf sebagai kontraktor kerja bertaraf Bumiputera. Pemberian pengiktirafan ini adalah tertakluk kepada syarat - syarat termaktub di belakang sijil.

NO. SIJIL PENDAFTARAN
0120051024-TR106928

GREJID PENDAFTARAN
G4 (Bumiputera)

TEMPOH SAHLAKU
DARI: 15/10/2012
HINGGA: 27/12/2013

NAMA DAN ALAMAT BERDAFTAR
ZBO PROTECH RESOURCES
29, JALAN BALIK BUKIT
20300 KUALA TERENGGANU

PEGAWAI SYARIKAT YANG DITAUHIAHKAN
ZAKARIA BIN OTHMAN

NO. K/P

JAWATAN
PENGURUS

PERAKUAN PENDAFTARAN

Adalah dengan ini diperakui bahawa kontraktor yang dinyatakan di bawah ini telah berdaftar dengan Lembaga mengikut Bahagian VI Akta Lembaga Pembangunan Industri Pembinaan Malaysia 1994. Pendaftaran ini adalah tertakluk kepada syarat-syarat yang telah ditetapkan di belakang Perakuan ini

No Pendaftaran: 0120051024-TR106928

Nama Kontraktor: ZBO PROTECH RESOURCES

Alamat Berdaftar: 29, JALAN BALIK BUKIT
20300 KUALA TERENGGANU
TERENGGANU

Gred, kategori dan pengkhususan berdaftar

G4 B B04 B14 B24
G4 CE CE21 CE20 CE36 CE34 CE13 CE01
G4 ME M15

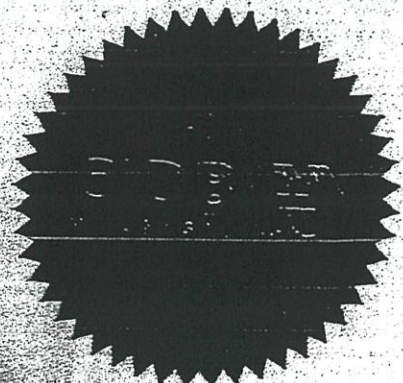
Tarikh Mula Berkuatkuasa: 24 OCT 2011

Tarikh Habis Tempoh Perakuan: 27 DEC 2013*

*Perakuan ini hendaklah diperbaharui selewat-lewatnya 60 hari sebelum tarikh habis tempoh.

STATUS : AKTIF - Kontraktor yang diawarkan projek semasa perakuan pendaftaran ini dikeluarkan.

(**AHMAD FARRIN BIN MOKHTAR**)
h.p. Ketua Eksekutif
Bernakrah: 24 SEP 2012





SURUHANJAYA SYARIKAT MALAYSIA
COMPANIES COMMISSION OF MALAYSIA



**PERAKUAN PEMBAHARUAN PENDAFTARAN
AKTA PENDAFTARAN PERNIAGAAN 1956**

BORANG E (KAEDAH 13)

No. Pendaftaran

TR0059371-K

**ZBO PROTECH RESOURCES
29 JALAN BALIK BUKIT
20300 KUALA TERENGGANU
TERENGGANU**

Dengan ini diperakui bahawa Perniagaan yang dijalankan dengan nama

ZBO PROTECH RESOURCES

telah didaftarkan dari hari ini sehingga **26 SEPTEMBER 2017** menurut peruntukan-peruntukan Akta Pendaftaran Perniagaan 1956, dengan nombor yang ditunjukkan di sini dan tempat utama perniagaannya di **29 JALAN BALIK BUKIT , 20300 KUALA TERENGGANU, TERENGGANU.**

Jenis Perniagaan

MEMBEKAL MAKANAN MENTAH BASAH, KERING, BERMASAK ISLAM, PERABUT, MESIN PEJABAT DAN KEDIAMAN, PERKAKAS ELEKTRIK, KELENGKAPAN KEMUDAHAN AWAM, ALAT KESELAMATAN JALAN RAYA, HIASAN DALAMAN, JALAN, KAWASAN, BANGUNAN, MENCUCI BANGUNAN, BERSIH KAWASAN, ANGKAT SAMPAH DAN KONTRAKTOR BINAAN-AM

Bertarikh di **KUALA TERENGGANU** pada **24 SEPTEMBER 2012.**

MOHD NAIM DARUWISH
Pendaftar Perniagaan Semenanjung Malaysia.

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Pengurus Projek
5. Embong Bin Ya'akub
Kampung Baloh, Manir,
Kuala Terengganu.
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Operator Machine
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Kerani Kewangan
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21070 Kuala Terengganu
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Kolej Teknologi Bestari
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Kerani Am
Ijazah Perakauan
Uni. Industri Selangor
9. Mohd Hisyamuddin Bin Abdullah
Kampung Seberang Tuan Chik,
Kuala Terengganu.
Pembantu Am
Sijil Pelajaran Malaysia

BIL	NAMA PROJEK / KONTRAK	AGENSI PELAKSANAAN / KONSULTANT	NILAI ASAL	TEMPOH KONTRAK		T/SIAP SEBENAR	LANJUTAN MASA & SEBAB-SEBAB LAD
				T/MULA	T/SIAP		
	B/F						
12	Kerja-kerja menurap semula jalan di Taman Impia Murni, Bukit Datu. K. Trg.	EDARAN BINA ENTERPRISE	RM 413,296.90	04/07/2008	04/07/2008	04/07/2008	
13	Membekal da memasang longkang dan lain-lain kerja berkaitan di Kg. Seberang Tuan Chik. Bukit Tunggal. K. Trg.	ABD KARIM ABD JALIL	RM 38,530.00	2008	2008	2008	
14	Kerja-kerja membina dan menyiapkan infrastruktur jalan sekitar kawasan perpindahan fasa III Kuala Ibai K. Trg.	UZIRIA ENTERPRISE	RM 134,050.00	2008	2008	2008	
15	Kerja-kerja menurap dan melebar jalan dalam Kg Banggol Pauh, Dun Bukit Tunggal. K. Trg.	RHA WAWASAN	RM 28,938.00	2008	2008	2008	
16	Melebar jalan dilaluan ke SMK Kompleks, Gong Badak. Kuala Terengganu.	MOHD SHAMSUDIN B. JUSOH	RM 20,000.00	2008	2008	2008	
17	Naiktaraf jalan serta kerja-kerja berkaitan di Kg. Padang Kolah, Padang, Kuala Terengganu.	KENDALI MURNI SDN. BHD	RM 40,000.00	2008	2008	2008	
18	Kerja-kerja membina dan menyiapkan infrastruktur jalan sekitar kawasan perpindahan fasa III Kuala Ibai K. Trg.	UZIRIA ENTERPRISE	RM 134,050.00	2008	2008	2008	
19	Kerja-kerja menurap dan melebar jalan dalam Kg Banggol Pauh, Dun Bukit Tunggal. K. Trg.	RHA WAWASAN	RM 28,938.00	2008	2008	2008	
20	kerja-kerja naiktaraf jalan Kampung Kubang Ikan dan lain-lain kerja berkaitan dengannya.	IM JAYA	RM 35,746.00	2008	2008	2008	
21	Menaiktaraf jalan Merah serta kerja-kerja berkaitan di Kg. Buloh Gading. K. Trg.	SNG BINA SDN. BHD.	RM 50,000.00	2008	2008	2008	
JUMLAH KESELURUHAN			RM 967,958.89				

NAMA SYARIKAT

NO.PENDAFTARAN PKK

TAHUN

NILAI KONTRAK

: ZBO PROTECH RESOURCES

: 1104 T 87 0436

: 2009

: RM 6,616,241.49

BIL	NAMA PROJEK / KONTRAK	AGENSI PELAKSANAAN / KONSULTANT	NILAI ASAL	TEMPOH KONTRAK		T/SIAP SEBENAR
				T/MULA	T/SIAP	
1	Cadangan membina dan menyiapkan sebuah (1) dewan makan terbuka setingkat dan lain-lain kerja berkaitan diatas sebahagian lot 3387 pusat pengajian anak yatim, mukim batu rakit,	FZ VALUE SOLUTION (MAIDAM)	RM 349,500.00	01/04/2009	2009	
2	Kerja-kerja membaiki dan menaiktaraf jalan sekitar taman sri kolam K.TRG	FZ VALUE SOLUTION (MBKT)	RM 310,000.00	01/07/2009	19/01/2009	
3	Kerja-kerja membina dan menyiapkan tapak bagi mengadakan perasmian pecah tanah untuk projek perumahan di padang hiliran	PERNIAGAAN USAHA CERGAS (PDKT)	RM 41,560.00	01/08/2009	2009	
4	Panji-alam, lorong gemia jalan budiman	AMIRA ENTERPRISE	RM 10,000.00	13/01/2009	2009	
5	Depan masjid, gong tok nasek	IM JAYA	RM 22,000.00	13/01/2009	2009	
6	Jalan dalam kawasan Fama Negeri Terengganu	HM PROLINE	RM 12,500.00	14/01/2009	2009	
7	Jalan ibrahim, panji alam	IM JAYA	RM 17,000.00	18/01/2009	2009	
8	Penyelenggaraan Am bangunan serta kerja-kerja berkaitan di pejabat pentadbiran di masjid hiliran K.TRG	PERNIAGAAN USAHA CERGAS (JPP)	RM 35,000.00	19/01/2009	16/04/2009	
9	Jalan panji alam	JOE	RM 7,000.00	18/01/2009	2009	
10	Membina jalan c/run serta kerja-kerja berkaitan di Kg. Paya Wak lah Kg. Mengabang telong, K.TRG	PERNIAGAAN BINA SAMA (JPP)	RM 30,000.00	2009	2009	
	JUMLAH		RM 834,560.00			

NAMA SYARIKATNO.PENDAFTARAN PKK
TAHUN

NILAI KONTRAK

: ZBO PROTECH RESOURCES
: 1104 T 87 0436
: 2010
: RM6,302,447.29

BIL	NAMA PROJEK / KONTRAK	AGENSI PELAKSANAAN / KONSULTANT	NILAI ASAL	TEMPOH KONTRAK		T/SIAP SEBENAR
				T/MULA	T/SIAP	
1	Cadangan membina dan menyiapkan bangunan depoh kedai rakyat dan lain-lain kerja yang berkaitan di AMC Bukit Payong, Marang, Terengganu.	FZ VALUE SOLUTION (FAMA)	RM 478,600.00	12.01.2010	30.8.2010	
2	Baikpulih Pejabat Yayasan Islam Terengganu.	PERNIAGAAN USAHA CERGAS	RM 27,951.00	24.1.2010	14.3.2010	
3	Membina dan menyiapkan jalan di kawasan rumah kedai Tepoh.	TR MAJU BINA SDN BHD (Swasta)	RM 67,395.30	10.02.2010	24.3.2010	
4	Kerja-kerja menambun tanah dan menanam rumput bagi membaik pulih tanah runtuh di taman perumahan Bukit Chendering, Kuala Terengganu.	PERNIAGAAN BINA SAMA (PDKT)	RM 19,992.00	07.3.2010	14.3.2010	
5	Gelanggang serbaguna di Kg Pasir Puteh, Tepoh Kuala Terengganu.	MAT HASAN YUSOFF (PDKT)	RM 10,000.00	08.3.2010	14.11.2010	
6	Kerja-kerja membaikpulih bahu jalan utama dan kerja-kerja menurap premix di kawasan sekitar taman perumahan Kg. Batin, Seberang Takir Kuala Terengganu.	MAT HASAN YUSOFF (PDKT)	RM 20,000.00	17.3.2010	29.3.2010	
7	Kerja-kerja melebar jalan dan kerja-kerja menurap premix pada selekoh dekat Chalet Anjung Pantai, Seberang Takir, Kuala Terengganu.	PERNIAGAAN BINA SAMA (PDKT)	RM 20,000.00	20.3.2010	24.3.2010	
8	Penyelenggaraan berkala pavemen, Jalan Hulu Takir, Daerah Kuala Terengganu.	ZBO PROTECH RESOURCES (PERMINT GRANITE)	RM 241,504.02	27.3.2010	11.4.2011	
9	Kerja-kerja membina menaiktaraf sistem perparitan di Taman Desa Kayangan, Batu Rakit, Kuala Terengganu.	MAT HASAN YUSOFF (MBKT)	RM 181,925.00	07.4.2010	26.5.2010	
JUMLAH			RM 1,067,367.32			

NAMA SYARIKAT
 NO.PENDAFTARAN PKK
 TAHUN
 JUMLAH KESELURUHAN

: ZBO PROTECH RESOURCES
 : 1104 T 87 0436
 : 2011
 : RM4,217,689.57

BIL	NAMA PROJEK / KONTRAK	AGENSI PELAKSANAAN / KONSULTANT	NILAI ASAL	TEMPOH KONTRAK		T/SIAP SEBENAR
				T/MULA	T/SIAP	
1	Cadangan membina dan menyiapkan sebuah stor utama di kampus induk Tesdec kawasan perindustrian Bukit Khor Daerah Marang , Terengganu.	FZ VALUE SOLUTION (TESDEC)	RM 280,600.00	2010	2011	
2	Kerja - kerja membina penahan hakisan pantai di pantai Tok Jembal serta kerja - kerja yang berkaitan di Daerah Kuala Terengganu.	ZIDANI ENTERPRISE (JPS)	RM 198,100.00	24.04.2011	04.06.2011	
3	Kerja - kerja membina longkang dan lain-lain kerja yang berkaitan dengannya di kampung Losong Haji Su, Dun Bandar, Kuala Terengganu.	PERNIAGAAN BINA SAMA (PDKT)	RM 54,830.00	03.03.2011	31.03.2011	
4	Membina dan menyiapkan pagar longkang dan lain-lain kerja berkaitan di kampung Simpang To Ku, Dun Bandar,	INSAN JAYA ENTERPRISE (PDKT)	RM 94,850.00	03.03.2011	30.04.2011	
5	Kerja-kerja membekal dan memasang longkang 'U' dan lain-lain kerja yang berkaitan dengannya di kampung Tok Ku, Dun Bandar, Kuala Terengganu.	EDYU ENTERPRISE (PDKT)	RM 58,600.00	14.03.2011	14.04.2011	
6	Kerja-kerja membekal dan memasang longkang 'U' dan 'V' serta lain-lain kerja yang berkaitan dengannya di Kg. Tok Kaya Dun Bandar Kuala Terengganu.	ABD. GHANI ABU BAKAR (PDKT)	RM 74,800.00	23.03.2011	19.04.2011	
7	Kerja-kerja menurap Premix dalam kawasan balai raya dan lain-lain kerja berkaitan di Kg. Kubang Badak Seberang Takir Kuala Terengganu.	MANSOR ISMAIL(PDKT)	RM 29,125.00	16.03.2011	29.03.2011	
JUMLAH			RM 790,905.00			

NAMA SYARIKAT
NO.PENDAFATARAN PKK
TAHUN

: ZBO PROTECH RESOURCES
: 1104 T 87 0436
: 2012

BIL	NAMA PROJEK / KONTRAK	AGENSI PELAKSANAAN / KONSULTANT	NILAI ASAL	TEMPOH KONTRAK		T/SIAP SEBENAR
				T/MULA	T/SIAP	
1	Cadangan membina dan menyiapkan 10 unit Rumah Teres Dua Tingkat di atas Pecah Lot no 7971 mukim Kuala Nerus Daerah Kuala Terengganu	ZBO PROTECH RESOURCES	RM 47,458.00	2012	2012	
2	Cadangan membina bangunan JKR Hulu Terengganu, Terengganu Darul Iman - kerja-kerja memotong slope	ZBO PROTECH RESOURCES	RM 10,800.00	2012	05/04/2012	
3	Menaiktaraf jalan premix dekat surau di Kampung Duyung Dun Seberang Takir	ZEE-MA ENTERPRISE	RM 20,000.00	17/01/2012	19/01/2012	
4	Kerja-kerja membaik pulih jalan di hadapan perumahan Kampung Batin Perdana di Dun Seberang Takir	ARZUNIZAN BINTI AB RAHIM	RM 14,000.00	25/01/2012	07/02/2012	
5	Menurap jalan premix di dalam kawasan Sek.Men. Keb Sri Budiman sempena lawatan Perdana Menteri ke Dun Batu Rakit	PERNIAGAAN USAHA CERGAS	RM 20,000.00	30/01/2012	01/02/2012	
6	Cadangan mereka bentuk, membina dan menyiapkan 243 rumah teres dan kerja-kerja berkaitan dengannya bagi program perumahan kos rendah (RKR) di kg Paya Lawas Mukim Jerangau Daerah Dungun, Terengganu - kerja jalan premix	MRI CONTRUCTIONS SDN BHD	RM 66,300.00	27/02/2012	28/02/2012	
7	Pavement works for periodic maintenance work with resurface & regulate at route T09, Jalan Tajin/ Kuala Telemong (sec 8.00-14.00) Daerah Hulu Terengganu	ZBO PROTECH RESOURCES	RM 308,463.37	2012	2012	
JUMLAH			RM 487,021.37			