DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

INSTALLATION PROCESS OF REINFORCED CONCRETE SQUARE PILE FOR TOLL PLAZA COMPLEX DAMANSARA – SHAH ALAM

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

DECEMBER 2018

It is recommended that the report of this practical training provided

by

NORAISYA BINTI MIS SUAN

2016458682

entitled

INSTALLATION PROCESS OF REINFORCED CONCRETE SQUARE PILE FOR TOLL PLAZA COMPLEX DAMANSARA – SHAH ALAM

be accepted in partial fulfillment of the requirement for obtaining the Diploma In 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 are stated herein, prepared during a practical training session that I underwent at Seleksi Bina Sdn. Bhd. for a duration of 14 weeks starting from 3 September 2018 and ended on 7 December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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Date : 18 December 2018

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

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

Thank you so much.

ABSTRACT

The word 'pile' is used to describe columns, usually of reinforced concrete which driven into or cast in the ground. Pile can be classified based on material, load transfer mechanism and method of installation. The purpose of this report is to identify the criteria should be considered in installation process of reinforced concrete square pile such as size of piles, machineries and equipment used and the location of pile. Additionally, this report also focuses on the installation process of reinforced concrete square pile. There are six stages involved in installing the reinforced concrete square pile which consist of setting out the pile point, marking the length of piles, handling & pitching the pile, welding process, drive of pile and record the piling work. There are three methods involved in this study which is document review, observation and interview session. The project is construction of Toll Plaza Complex Damansara – Shah Alam Elevated Expressway in RRIM area, Sungai Buloh Selangor under the concessionaires or Build-Operate-Transfer (BOT) operator company by Projek Lintasan Kota Holdings Sdn. Bhd. (PROLINTAS). The objective of this practical training is can provide early exposure and experience to students before stepping to the real world of work. Also can make student more particular in managing their time in prepare report practical during working hour.

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Piles have been used since prehistoric times. It is can be defined as a column that inserted into the ground and act as foundation to support the super structure in many types of ground condition. Piles are required where soil is performing poorly and used to spread the load from the structure into the ground. Usually piles are used for high-rise building work, highways and bridges because there is a weak layers of soil on the ground and the layer cannot support the load of the structure. Then, the loads of the structure will be transferred to the soil or rock which stronger to avoid erosion and deposition of soil. The pile also used to increase the bearing capacity of soil and to reduce settlements at sites with weak compressible soil. Piles can be classified based on material, load transfer mechanism and method of installation (Aamir, 2016).

The selection material of pile depends on the ground condition. Material of piles commonly used at any construction industry in Malaysia namely precast concrete pile, steel pile, timber pile and composite pile. Precast concrete piles can be either reinforced concrete pile or prestressed concrete pile and widely used because the structure of soil in Malaysia suitable with the installation process. Spun pile is a prestressed concrete pile with circular hollow section and suitable for high-rise building, marine structure and bridges. Figure 1.1 shows the bore piles which used to support high buildings which produce heavy vertical loads and if the construction site is located in a hard and rocky soil structure. Next, there are many types of steel piles such as H-pile, pipe pile and sheet pile which suitable for area where the depths of bearing strata are variable. Figure 1.2 shows the sheet piles which thin interlocking sheets of steel are used to obtain a continuous barrier in the ground. It can be used temporarily or permanently (Abdul Rohman, 2015).

Figure 1.1: Bore pile.
Source: Abdul Rohman (2015).

Figure 1.2: Sheet pile.
Source: Doug Ingersoll (2012).

There are two fundamental types of pile foundation based on load transfer mechanism such as end bearing pile and friction pile. Figure 1.3 shows the end bearing pile and friction pile. In actual practice, virtually all piles are supported by a combination of skin friction and end bearing. End bearing piles are driven into the ground until a hard stratum is reached. The shafts of the pile act as column to support the super-structure and carry the load through the overlaying weak subsoil to firm strata into which the pile has to penetrate. However, friction piles are used where soil is weak or soft to a considerable depth and it is not economical. The friction piles are mainly supported by adhesion or friction action of the soil around the perimeter of the pile shaft. Friction is any foundation imposes on the ground and the pressure will spread out to form a pressure bulb. If a suitable load bearing strata cannot be found at an acceptable level, particularly in stiff clay soils, it is possible to use a pile to carry this pressure bulb to a lower level where s higher bearing capacity is found (Sew and Meng, 2009).

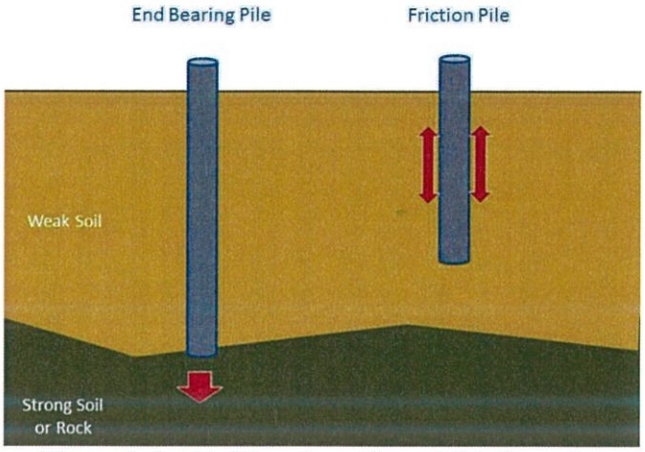

Figure 1.3: End bearing pile and friction pile.
Source: Sew and Meng (2009).

Subsequently, piles can be classified based on method of installation such as displacement and replacement piles. Displacement piles cause the soil to be displaced radially as well as vertically as the pile shaft is driven into the ground. The drop hammer is the most commonly used method of insertion of displacement piles. The advantages of displacement piles are can be driven in very long lengths and material forming pile can be inspected for quality. Meanwhile, replacement piles cause the soil to be removed by machine boring and filled with concrete. These types of pile are considered for sites where piling work is being carried out in close proximity to existing buildings or where vibration and noise restricted. The advantages of replacement piles are can be installed in conditions of low headroom and material forming pile is not governed by handling or driving stresses (Essays UK, 2018).

The common types of pile foundation are shallow and deep foundation. Shallow foundation are defined as those where the depth are less than 3 meters below the finished ground level. They include pad foundation, strip foundation and raft foundation. Pad foundation are used to support and transmit the load from pier or column and not suitable for large and high-rise building. Apart from that, strip foundation used to support and transmit the load from heavy wall. There are buildings designed without columns instead, wall distributes load from other components to the foundation of the building. Besides that, the depth of deep foundation is greater than shallow foundation. Deep foundation can be used to transfer the loading to deeper, more competent strata at depth if unsuitable soils are present near the surface. They include pile foundation, pier foundation and caissons (Jamal, 2017).

The factors in the selection of pile foundation need to be considered for durable building construction. First of all, the factor is the superstructure design and loads from the building. This load is a combination of dead load, imposed load and wind load. The quantity of load depends on the type of structure, number of floor and material used for the construction. Secondly, the factor affecting selection of foundation is the soil condition. Therefore, soil investigation should be carried out to know the nature and types of soil, depth of water table, depth of different layers of soil and the bearing capacity of soil at different levels. Thirdly, the factor also based on the types of foundation selected for the buildings in the neighboring buildings for the same types. Based on the success or failure of foundations for such buildings, decision can be taken for the selection of foundation (Jamal, 2017).

This study focuses on the criteria should be considered and installation process of reinforced concrete square pile for Plaza Toll Complex Damansara – Shah Alam entitled "Cadangan membina sebuah kompleks tol di kawasan RRIM arah Kota Damansara, Mukim Sungai Buloh, Selangor, daerah Petaling bagi projek penswastaan lebuhraya bertingkat Damansara - Shah Alam". The installation process of reinforced concrete square pile in this project will be carried out accordingly to the construction methodology approved by the S.O and Consultant's Engineer.

1.2 Objectives

The aim of this study is to accomplish of objectives which included:

1. To identify the criteria should be considered in installation process of reinforced concrete square pile.
2. To determine the installation process of reinforced concrete square pile.

1.3 Methods of Study

The list shows the method that used to collect the information for this report.

i. Document review

Review the company profile, monthly progress report, weekly progress report and construction drawing for the project. The construction drawing include road work, drainage work, sewerage work, water work, escape work, geotechnical work, structure work, mechanical work, electrical work and toll collection system infrastructure. Besides that, review the method statement for piling works.

ii. Observation

Observed the activities on site for 14 weeks such as survey works and understanding the method installation of reinforced concrete square pile in detail. Photo was taken as an extra medium of study to enhance understanding of process involved.

iii. Interview

Interview Mr. Nor Idzuan of Construction Manager, Mr. Akmal, Site Engineer, Mr. Haziq, Assistant Quantity Surveyor and Mr. Syafaiq, Site Safety Supervisor about the projects to be done in detailed. In addition, interview Mr. Nazri of Piling Operator and Mr. Shah of Piling Supervisor about the right installation process of reinforced concrete square piles and the problem encountered in piling works.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Seleksi Bina Sdn. Bhd. was incorporated on 13th January 2001 known as Seleksi - Worthy Builders Sdn. Bhd. The new name was changed on 12th September 2007 to reflect its status as a wholly owned bumiputra company. Presently, the paid up share capital of the company is RM1.0 million. The company's core business is in the civil, infrastructure and building construction. Seleksi Bina Sdn. Bhd. was awarded the High Achievement Bumiputra Contractor Grade A by Bahagian Pembangunan Kontraktor & Usahawan, Kementerian Kerja Raya Malaysia on 28th December 2015.

Since its incorporation, it had constructed and completed three packages for the earthworks and drainage works for the construction of the East Coast Expressway Phase 1 and 2 with an overall construction value of more than RM115.0 Million. The company also constructed the extension and renovation works for Universiti Kebangsaan Malaysia Specialist Centre, Kuala Lumpur. The company owns a sizeable fleet of multiple types of heavy and light machineries which enables them to perform the infrastructure works by themselves.

The Company had obtained the Grade G7 License issued by Construction and Industrial Development Board (CIDB) and G7 Bumiputra License issued by Pusat Khidmat Kontraktor (PKK) since 2002. It had also obtained the G8 and G6 License from Felda Global Ventures Holdings Berhad and also registered with Malaysian Ministry of Finance. The Company had also secured the ISO 9001: 2008 from Standards Malaysia.

The directors and senior management of the company are experienced personnel in construction works, manufacturing and financial services. Their experiences in construction works encompass among others construction of high rise buildings, highways, university campus, residential estate, manufacturing plants, dams,

sewerage works, tunnelling and sports complex. They also have experience in dealing with Turnkey Design - Build and also direct negotiated projects with Malaysian Government.

2.2 Company Profile

Company Name	:	Seleksi Bina Sdn. Bhd.
Registration No	:	536707-H
Registration Address	:	Block C32-2, Jalan Medan Selayang 1, Medan Selayang, Batu Caves, 68100 Selangor, Darul Ehsan, Malaysia.
Incorporation Date	:	13th January 2001
Telephone No	:	603 – 6187 8188 / 603 – 6185 8189
Fax No	:	
E-mail	:	1. seleksibina@gmail.com 2. murad.nik@gmail.com
Authorised Capital	:	RM 1,000,000.00
Paid Up Capital	:	RM 1,000,000.00
Type of Entity	:	Private Company
Share Holders	:	1. Seleksi Sakti Sdn Bhd - 52.5% 2. Nik Murad Nik Mohd Kamil - 47.5%
Board of Directors	:	1. Nik Murad bin Nik Mohd Kamil 2. Nor Nazra Wan Ibrahim

Registrations	:	1. Pusat Khidmat Kontraktor (PKK) – Kelas G7 Bumiputra 2. Construction Industry Development Board (CIDB) – Sijil Perolehan Kerja Kerajaan G7 Kementerian Kewangan Malaysia FELDA Global Ventures Holdings Berhad – Kejuruteraan G8 and G6 ISO 9001 : 2008 from UKAS Quality Management And Standard Malaysia
Main Bankers	:	1. CIMB Bank Berhad 2. Maybank Berhad 3. Public Bank Berhad

2.3 Organization Chart

Figure 2.1 shows the organization structure for the project and Table 2.1 details out the responsibilities of individuals that make up the team.

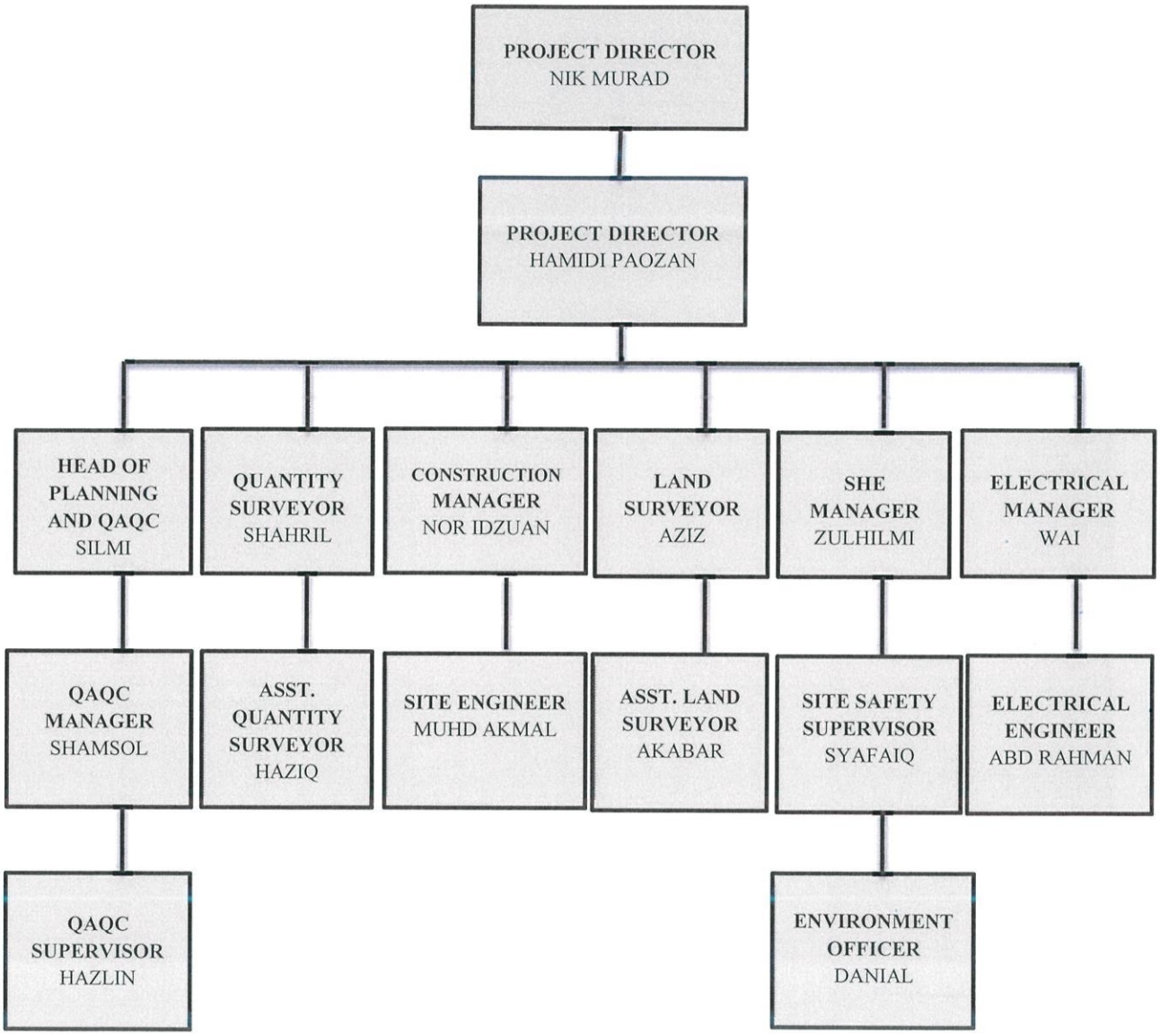

Figure 2.1: Organization structure for the project.
Source: Haziq (2018).

Table 2.1: Project team job description

NAME	DESIGNATION	RESPONSIBILITY
Nik Murad	Project Director	Monitoring progress, providing financial control and ensuring project quality
Hamidi Paozan	Project Manager	Report progress on projects by suitable media to sector management, maintain and update project reporting, checkpoints and financial reporting to a high standard
Silmi	Head of Planning and QAQC	Manage and oversee project quality to ensure compliance to codes, standards, regulations, equipment specific specifications and QMS requirements
Shamsol	Scheduler and QAQC Manager	Manage and oversee project quality to ensure compliance to codes, standards, regulations, equipment specific specifications and QMS requirements
Hazlin	QAQC Supervisor	Oversees and monitors the inspection and testing of materials, parts and products to ensure adherence to established quality standards
Shahril	Quantity Surveyor	Managing all costs related to civil engineering and building projects
Haziq	Asst. Quantity Surveyor	Provide advice and report on and control all commercial and financial aspects of projects and contracts
Nor Izuan	Construction Manager	Go over plans and blueprints, making timetables for the project, determining material, hiring subcontractors and workers, scheduling workers on site and gathering permits

Table 2.1: Continued of project team job description

NAME	DESIGNATION	RESPONSIBILITY
Muhd Akmal	Site Engineer	Advice in the planning, co-ordination and supervision of technical aspects of construction projects
Aziz	Land Surveyor	Make exact measurements and determine property boundaries. Provide data relevant to the shape, contour, gravitation, location, elevation or dimension of land
Akabar	Asst. Land Surveyor	Adjust and operate surveying instruments to determine precise boundaries of land parcels
Zulhilmi	HSE Manager	Evaluate the workplace environment and develop safety-management policies that identify and define the safety responsibilities of all employees
Syafaiq	Site Safety Supervisor	Assess and manage safety hazards in the workplace
Danial	Environment Officer	Investigate incidents that affect health such as pollution, noise control, toxic contamination, food poisoning and waste management
Wai	Electrical Manager	Provides electrical engineering recommendations and technical support on electrical engineering reviews
Abdul Rahman	Electrical Engineer	Evaluates electrical systems, products, components, and applications by designing and conducting research programs

2.4.1 Complete Project

Table 2.2: List of complete project

No	Name of Project	Client	Contract Amount	Contract Period
1	University Kebangsaan Malaysia Specialist Centre, Kuala Lumpur Extension Building and Part Renovation of the Existing Building.	Universiti Kebangsaan Malaysia (UKM)	RM 14.4 Million	13/06/2010 to 12/04/2013
2	Construction of Vehicle Box Culvert, Concrete Slab, Culvert, Sumps and Drainages for Duta – Ulu Kelang Expressway (DUKE) Phase 2 Section 2 – Tun Razak Link.	Malaysian Highway Authority	RM 10.4 Million	05/09/2016 to 04/04/2017

2.4.2 Project in Progress

Table 2.3: List of project in progress

No	Name of Project	Client	Contract Amount	Contract Period
1	Proposed Privatization of Damansara - Shah Alam Elevated Expressway	Projek Lintasan Kota Holdings Sdn. Bhd. (PROLINTAS)	RM 33.5 Million	25/06/2018 to 24/12/2019

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

Figure 3.1 shows the overall construction area in RRIM area, Kota Damansara, Mukim Sungai Buloh, Selangor and Figure 3.2 shows the toll plaza complex construction layout.

Figure 3.1: Overall construction area in RRIM area, Kota Damansara, Mukim Sungai Buloh Selangor.

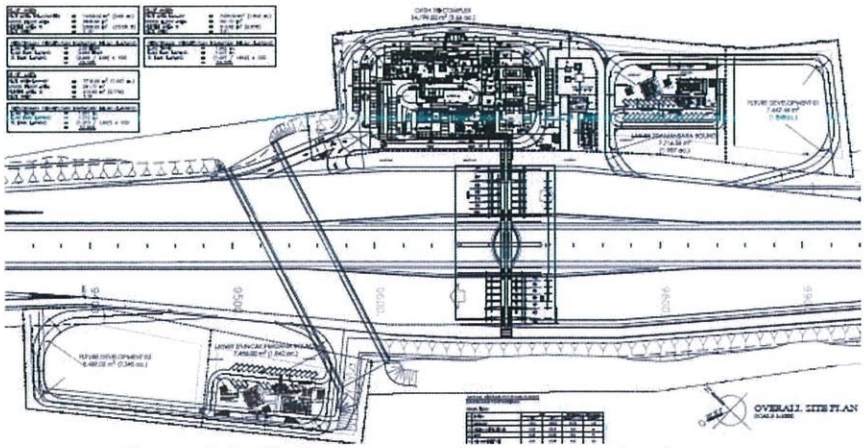

Figure 3.2: Toll plaza complex construction layout.

The project is construction of the Toll Plaza Complex Damansara – Shah Alam Elevated Expressway in RRIM area, Kota Damansara, Mukim Sungai Buloh, Selangor under the concessionaires or Build-Operate-Transfer (BOT) Operator

Company by Projek Lintasan Kota Holdings Sdn. Bhd. (PROLINTAS). The toll plaza complex consists of 14 lanes including three main buildings which are consist of Administration Building, Maintenance Depot Building and Supervision Building. The toll plaza will connect to the proposed elevated mainline from Jalan Sungai Buloh to the other proposed mainline at Persiaran Surian. The project value is RM 33.5 Million with 18 months of the construction period. The project started from 25th June 2018 expected to finish on 24th December 2019.

This report focuses on the installation process of reinforced concrete square pile for the toll plaza complex. The area need to be piled are TNB Substation, Water Tank, Maintenance Depot Building, Toll Canopy, OSD Tank 1, OSD Layby 2 and OSD Layby 3. The sizes of reinforced concrete square pile used are 150mm x 150mm, 200mm x 200mm and 250mm x 250mm with cast iron shoe. The reinforced concrete square piles were supplied from HUME Sdn. Bhd. and Sejati Konkrit Sdn. Bhd. with Grade 45. Sub-contractor for the piling works is KLL Piling & Jack In Sdn. Bhd.

3.2 The Criteria Should be Considered in Installation Process Reinforced Concrete Square Pile

There are three criteria should be considered in installation process reinforced concrete square piles which are as follows:

i. Sizes of pile

The sizes of pile used for this project are 150mm x 150mm, 200mm x 200mm and 250mm x 250mm. 150mm x 150mm sizes of pile are used in Water Tank and TNB Substation area. However, 200mm x 200mm sizes of pile are used in OSD Tank 1, OSD Layby 2 and OSD Layby 3 area. For Maintenance Depot Building and Toll canopy area, the sizes of pile used are 250mm x 250mm (Photo 3.1).

Photo 3.1: Reinforced concrete square pile.

ii. Machineries and equipment

a) Mobile crane

Mobile crane is used to lifting the reinforced concrete square pile (Figure 3.3).

Figure 3.3: Mobile crane.

b) Hydraulic piling machine

Hydraulic piling machine are used to driven the piles into the ground to provide foundation support for buildings or other structures. There are two piling machines used in this project that have different kind of hammer weight which is 3 tones and 8 tones. The hammer drop for hammer weight 3 tones is 450mm and for 8 tones is 400mm (Photo 3.2).

Photo 3.2: Hydraulic piling machine.

c) Excavator

There are two units of excavator used to excavate soil in the OSD tank 1 area, OSD Layby 2 and OSD Layby 3 of 4 meters' depth (Photo 3.3).

Photo 3.3: Excavator are used to excavate soil at the OSD area.

d) Welding set

Welding set are used to connect the starter pile with another pile extension (Photo 3.4).

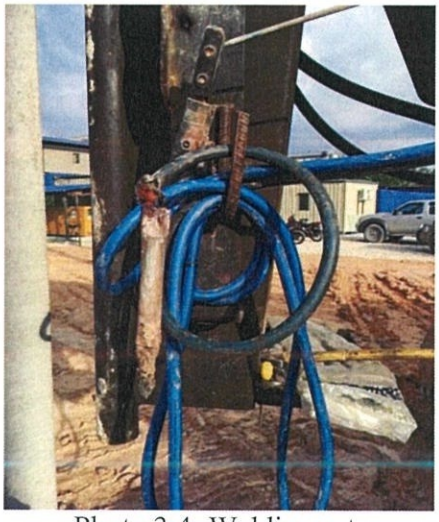

Photo 3.4: Welding set.

e) Steel plate

The size of steel plate used in this project is 1829mm x 5994mm x 25mm and was placed under the piling machine to ensure the machine not sink into the soil (Photo 3.5).

Photo 3.5: Steel plate.

iii. Location

a) Water Tank

Appendix A shows the piling numbers in water Tank Area. There are 28 numbers of reinforced concrete square pile has been installed with average depth 17.90 meters for each point (Photo 3.6).

Photo 3.6: The piling points at Water Tank area.

b) TNB Substation

Appendix B shows the piling numbers in TNB Substation area. There are 32 numbers of reinforced concrete square pile has been installed with average depth 17.50 meters for each point (Photo 3.7).

Photo 3.7: The piling points at TNB Substation area.

c) Maintenance Depot Building

Appendix C shows the piling numbers in Maintenance Depot Building area. There are 56 numbers of reinforced concrete square pile has been installed with average depth 14.00 meters for each point (Photo 3.8).

Photo 3.8: The piling points at Maintenance Depot Building area.

d) Toll Canopy

Appendix D shows the piling numbers in Toll Canopy area. There are 76 numbers of reinforced concrete square pile has been installed with average depth 16.50 meters for each point (Photo 3.9).

Photo 3.9: The piling points at Toll Canopy area.

e) OSD Tank

The reinforced concrete square pile has been installed are 162 points for OSD Tank 1, 171 points for OSD Layby 2 and 171 points for OSD Layby 3. For OSD area, only 9 meters length of pile needed to embed for each point. Appendix E shows the piling numbers in OSD tank 1 area (Photo 3.10).

Photo 3.10: The piling points at OSD Tank 1.

3.3 The Installation Process of Piling Work using Reinforced Concrete Square Pile

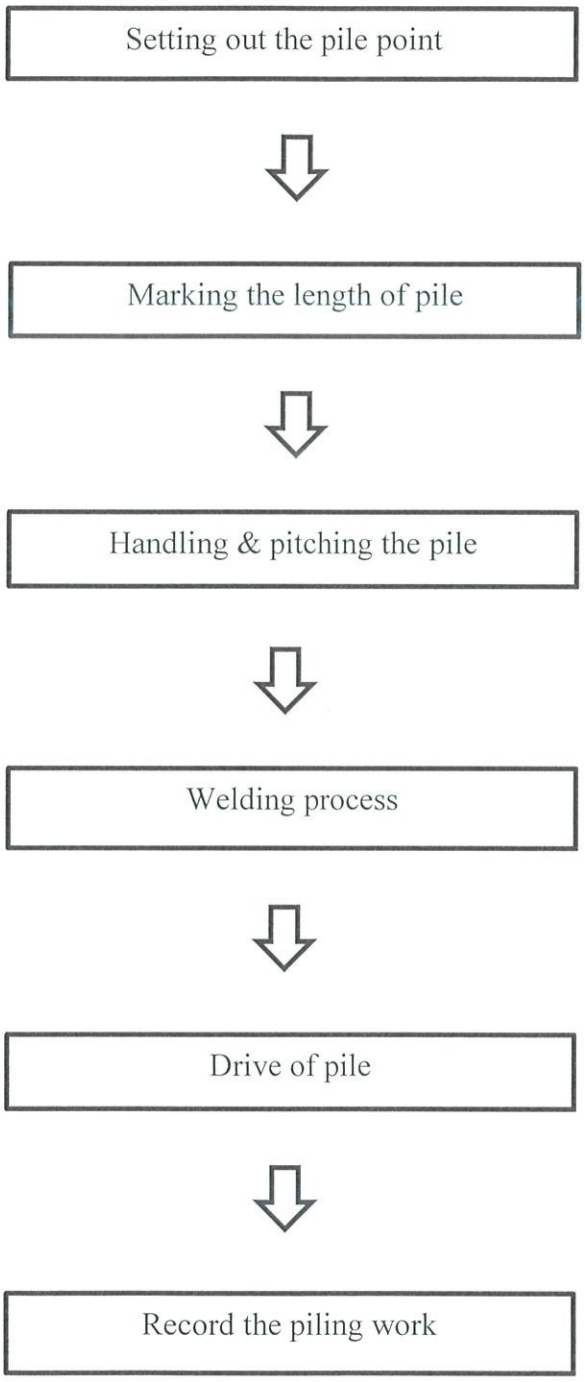

Figure 3.4: The construction sequence installation process of reinforced concrete square pile

3.1.1 The Installation Process of Reinforced Concrete Square Pile

i. Setting out the pile position

The piles setting out shall be carried out by qualified land surveyor according to the construction drawing. Appendix A, B, C, D and E states in detailed of piles position for this project. The pile position shall be marked with peg at 300mm length.

ii. Marking the length of pile

All piles shall be marked with red paint in every 0.5 meters spacing in order to clearly indicate the pile penetration length.

iii. Handling and pitching of pile

The pile lifted and inserted into the Hydraulic Pile Machine to proceed the installation. Photo 3.11 shows the 12 meters length starter piles with cast iron shoe are lifted and pitch accurately at the point marked with greatest care. A photo 3.12 show a spirit level is used to ensure the pile is in the straight position. Then, the starter pile will be driven into the ground. The operator and main-con supervision are strictly controlled the hammer drop height in order to avoid generation of high tensile stresses which may lead to damage of piles.

Photo 3.11: A worker was handling the pile.

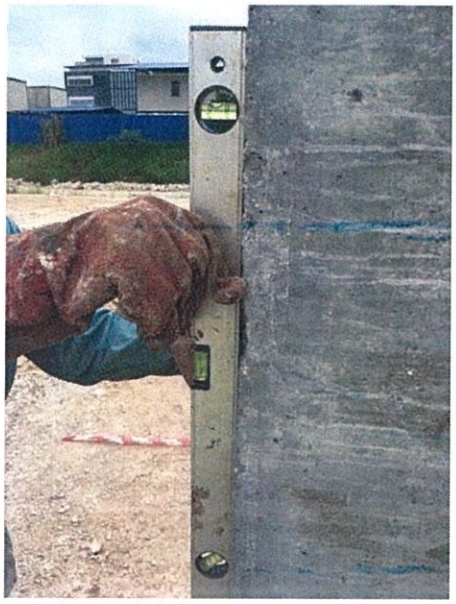

Photo 3.12: Spirit level are used to ensure the pile is in the straight position.

iv. Welding process

Welding process should be witnessed and checked by COW before continuing the pile installation. Photo 3.13 shows the welding process is carried out to connect the starter pile with other extension of pile and shall be record. All pile joints should be fully rounded butt weld. In addition, welded pile will be leaving about 5 minute for anti-rust application. Photo 3.14 shows the pile joints processes are completed.

Photo 3.13: Welding process is in process.

Photo 3.14: Pile joints are completed.

v. Installation of pile until achieve the final set

Drive the 1st extension of pile with 9 meters length into the ground by the hammer drop until obtain the final set and the penetration is reached. The predetermined set must be obtained for three consecutive trails of 10 blows each before driving can be stopped. Photo 3.15 shows a worker was take the blows of set when pile reaches the hard rock using graph paper.

Photo 3.15: A worker was take the blows of set using a graph paper

vi. Record the piling work

Photo 3.16 shows a worker was recorded the piling reading in the Piling Form. The piling records shall have the project name, pile position or reference gridline, pile size, length from toe to ground level, total penetration depth of pile, welding record, weight of hammer, drop height of hammer, date of driving, worker name, block reference, no. of blows, set reading graph and initial of three parties. All pile records shall be checked correct and signed by the Piling Contractor's, Contractor Representative's and Consultant Representative's respectively.

Photo 3.16: A worker was recorded the pile reading.

vii. Excavate and cut off pile work

Excavated the soil and then cut off the head of pile to the specific level. Backhoe loader is needed to excavate the soil and hydraulic pile cutter is used to cut the piles. This process shall be done carefully to avoid shuttering or otherwise damages of pile.

Project	Proposed Privatization of Damansara - Shah Alam Elevated Expressway	**Date**	22th November 2018
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Element	The Installation Process of Reinforced Concrete Square Pile		

No	Diagram	Machinery/tools	Manpower/labor	Duration
1	Setting out the pile points	1 theodolite 1 tripod 1 leveling staff 1 hammer 696 pegs	1 land surveyor 2 skilled labours 1 general labour	69 days (696 points)
2	Marking the length of piles	3 brush 3 paint 3 measuring tape Reinforced concrete square piles	3 general labours	35 days (696 RC piles)

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Element	The Installation Process of Reinforced Concrete Square Pile		

No	Diagram	Machinery/tools	Manpower/labor	Duration
3	Handling and pitching of piles  	2 hydraulic piling machines Reinforced concrete square piles 4 steel plates 2 spirit levels	4 skilled labours	90 days (696 points)

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Element	The Installation Process of Reinforced Concrete Square Pile		

No	Diagram	Machinery/tools	Manpower/labor	Duration
4	Welding process 	2 welding set	2 skilled labours	30 days (696 points)
5	Drive of pile until achieve the final set 	2 hydraulic piling machines Reinforced concrete square piles 4 steel plates 4 spirit levels	4 general labours	45 days (696 RC piles)

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Element	The Installation Process of Reinforced Concrete Square Pile		

No	Diagram	Machinery/tools	Manpower/labor	Duration
6	Record the piling work 	Piling Form Pen	2 general labours	135 days (696 points)
7	Excavate the soil and cut off pile	1 backhoe loader 2 hydraulic pile cutter	1 operator 2 skilled labours	60 days

CHAPTER 4.0

CONCLUSION

4.1 Conclusion

Reinforced concrete square pile is favorable than other piling process even there are many problem occurred such as the pile was crack and others. Because there is no waste of time and materials so it is economical and easy. It can bear heavier load and transfer it to the ground soil. Also the transportation cost is not high. Reinforced concrete pile also widely used in Malaysia because the structure of soil suitable with this piling method. Besides, each of the workers and officer also need to understand their designation to give hand in this company. The authorities and consultant as explain on earlier chapter will be the challenge for this company to grow better and experienced any kind of issues. All the main contractor should aware about the bills of quantities and their rate while tendering the project.

The purpose of this report is to identify the criteria should be considered in installation process of reinforced concrete square pile such as size of piles, machineries and equipment used and the location of pile. Additionally, this report also focuses on the installation process of reinforced concrete square pile. There are six stages involved in installing the reinforced concrete square pile which consist of setting out the pile point, marking the length of piles, handling & pitching the pile, welding process, drive of pile, record the piling work, excavate the soil and cut off pile work. There are three methods involved in this study which is document review, observation and interview session.

Moreover, the cooperation between workers is very important in order to accomplish the project. Evidently, the practical training has greatly enhanced the student's knowledge and better understanding about a construction site. Last but not least, through this practical training, students were able to know further more about the process of different building elements like the installation process of reinforced concrete square pile, column, formwork, reinforcement bar and so on.

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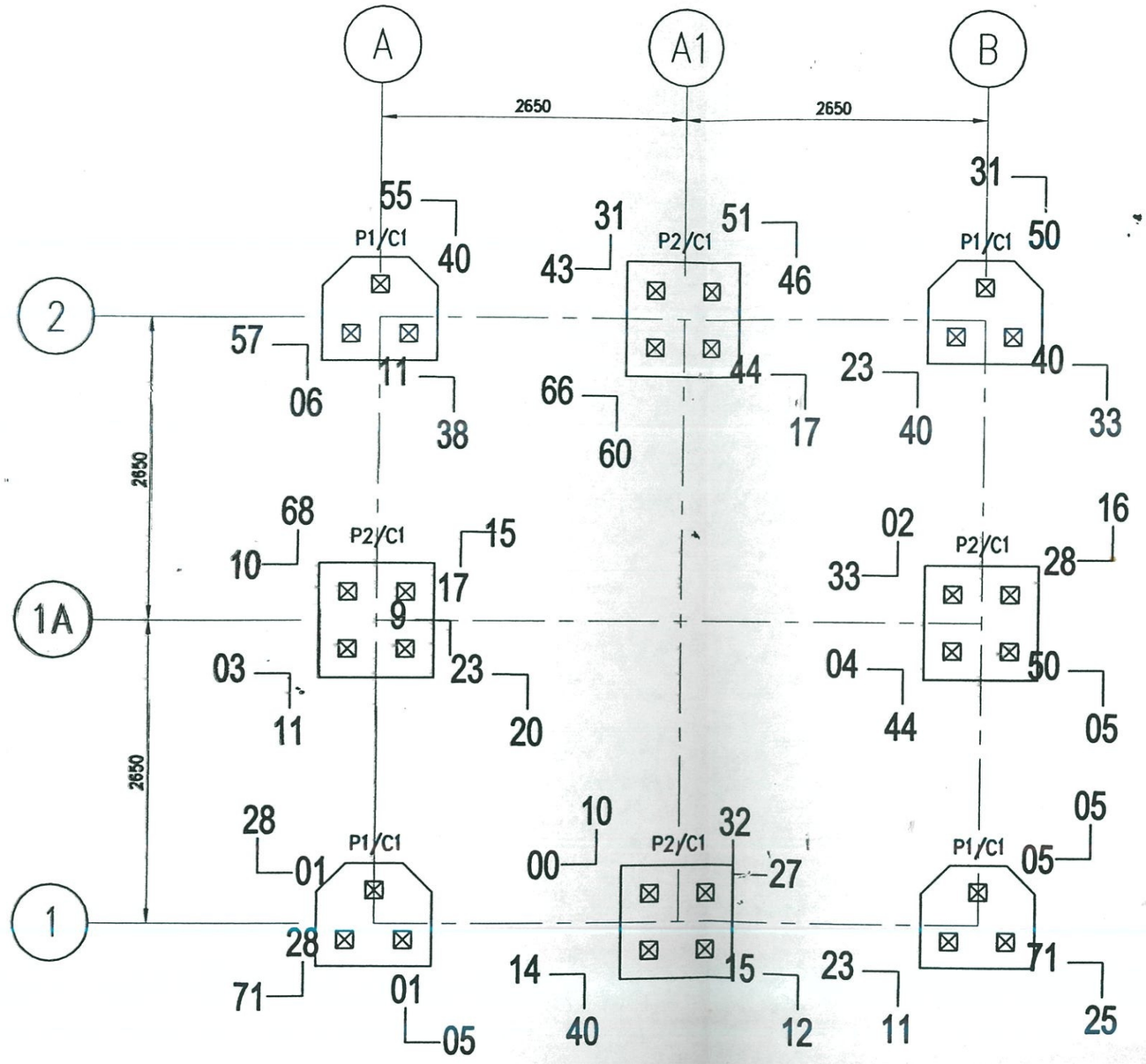
APPENDICES



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12th FLOOR, MENARA PNB, 201-A,
JALAN TUN RAZAK, 50400 KUALA LUMPUR

CONSULTING ENGINEERING FIRM :

KHAIRI CONSULT SDN BHD
CONSULTING ENGINEERS
76, JALAN SG 4/6, TAMAN SERI GOMBAK,
68100 BATU CAVES, SELANGOR DARUL EHSAN

DESIGNED BY :
DRAWN BY :
CHECKED BY :
DATE :

JURUK BERLESEN :

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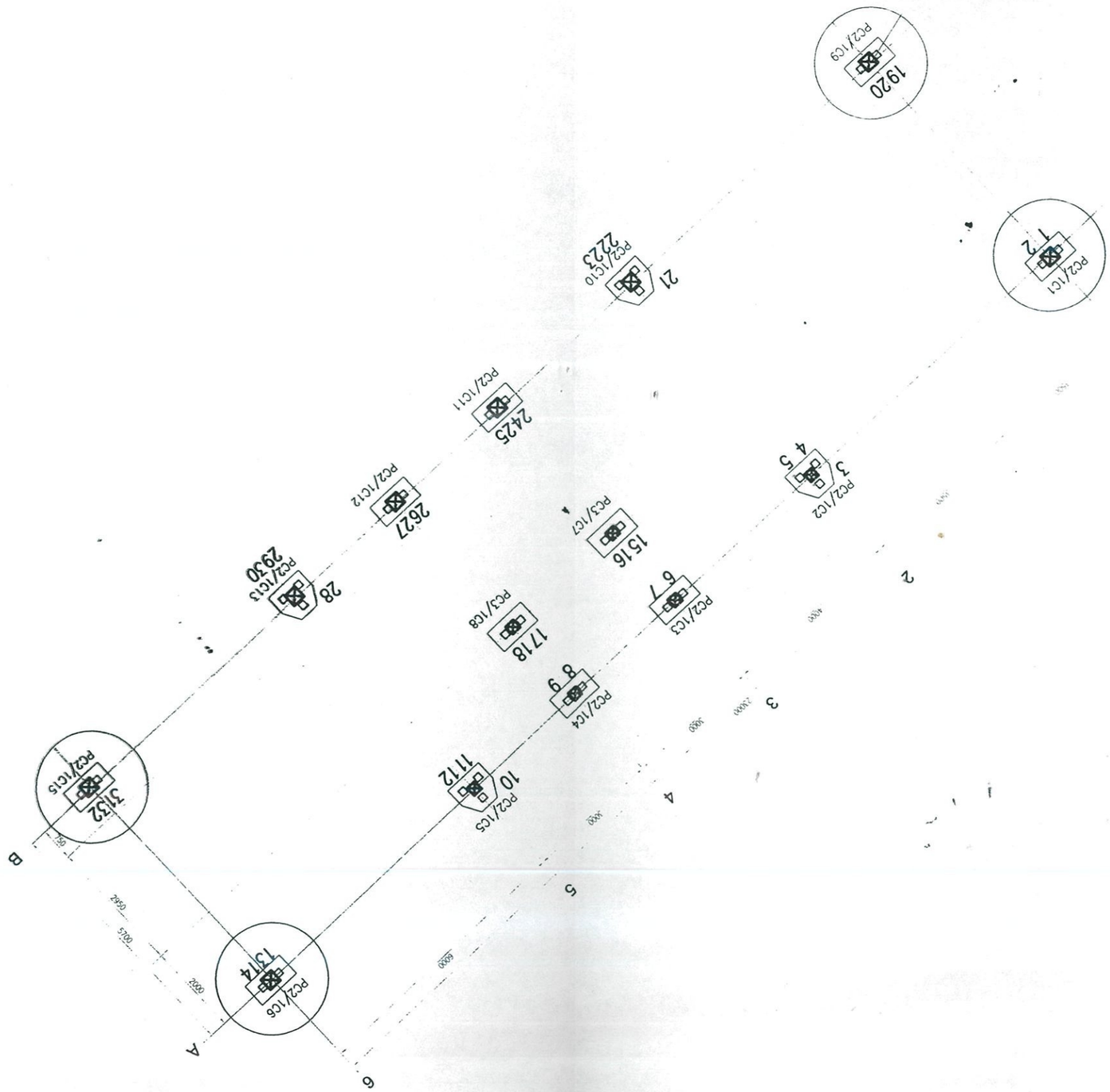
(MALAYSIAN HIGHWAY AUTHORITY)

PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT
DAMANSARA - SHAH ALAM
(SEKSYEN A - PUNCAK PERDANA KE KOTA DAMANSARA)

DRAWING TITLE :

PILING NUMBERS IN WATER TANK

APPENDIX B



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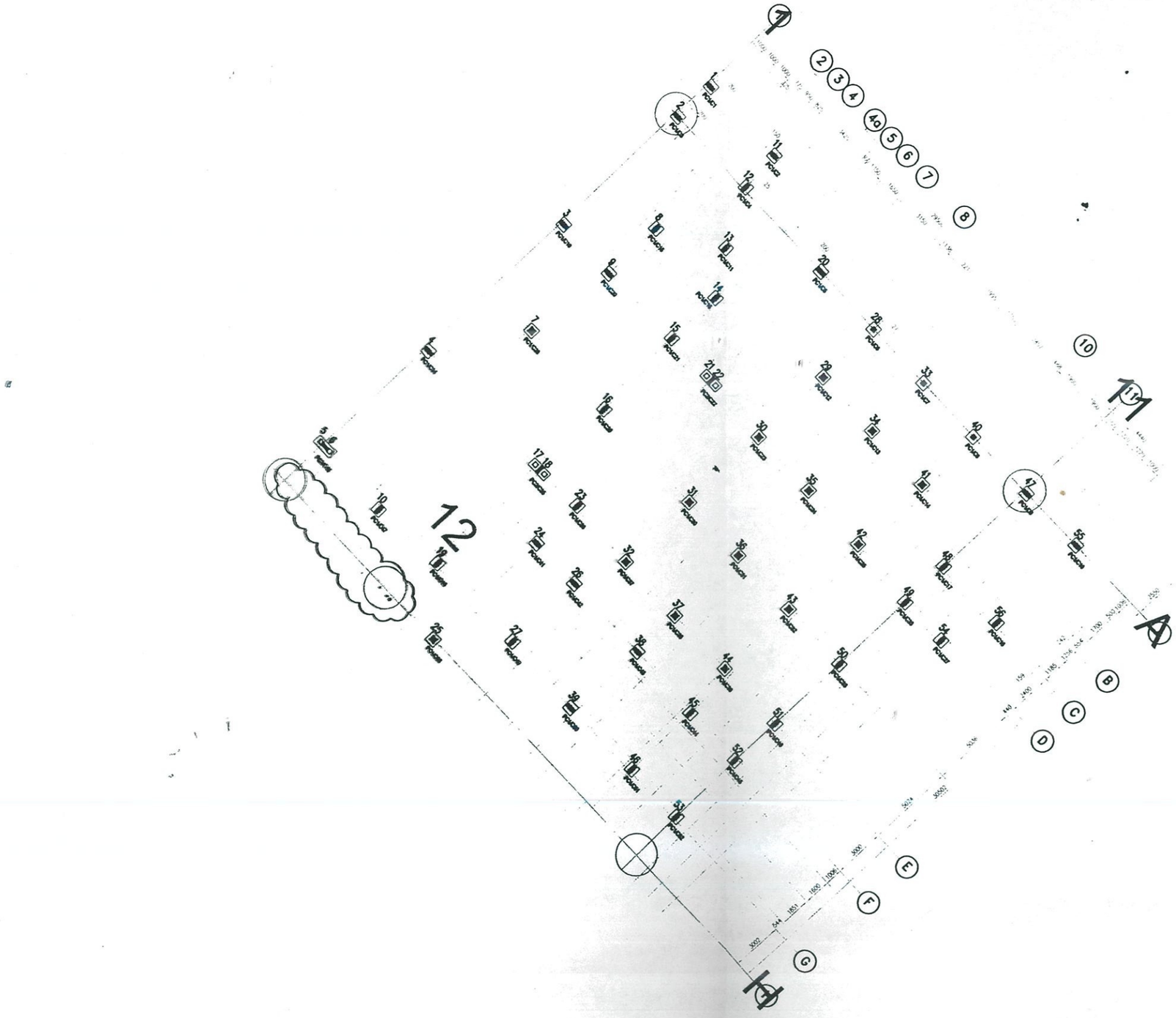
PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT
DAMANSARA - SHAH ALAM
(SEKSYEN A - PUNCAK PERDANA KE KOTA DAMANSARA)

DRAWING TITLE :

PILING NUMBERS IN TNB SUB STATION

APPENDIX C



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68100 BATU CAVES, SELANGOR DARUL EHSAN

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JURUK BERUKUR :

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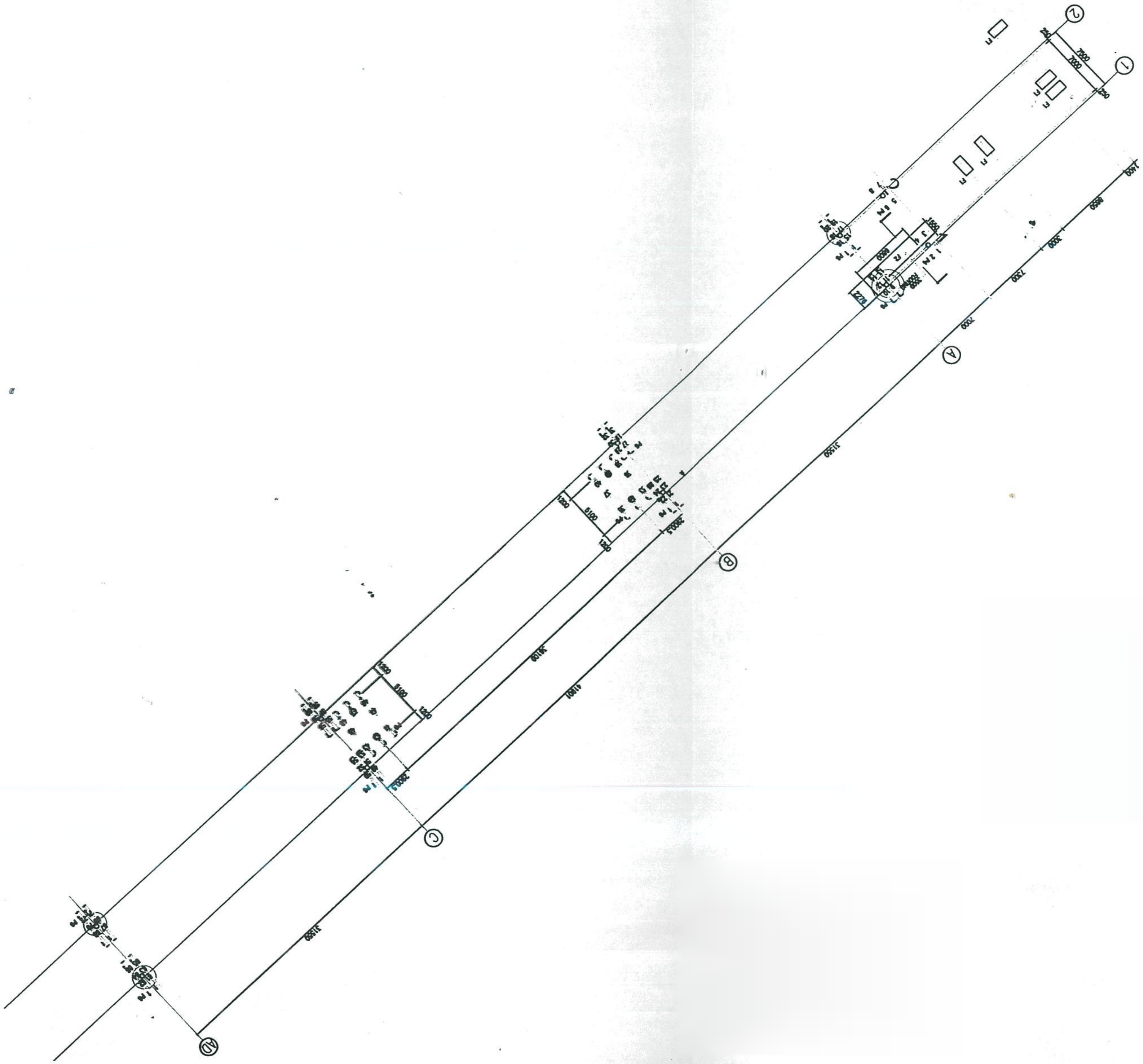
PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT
DAMANSARA - SHAH ALAM
(SEKSYEN A - PUNCAK PERDANA KE KOTA DAMANSARA)

DRAWING TITLE :

PILING NUMBER IN MAINTENANCE DEPOT

APPENDIX D



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(MALAYSIAN HIGHWAY AUTHORITY)

PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT DAMANSARA - SHAH ALAM
(SEKSYEN A - PUNCAK PERDANA KE KOTA DAMANSARA)

DRAWING TITLE :

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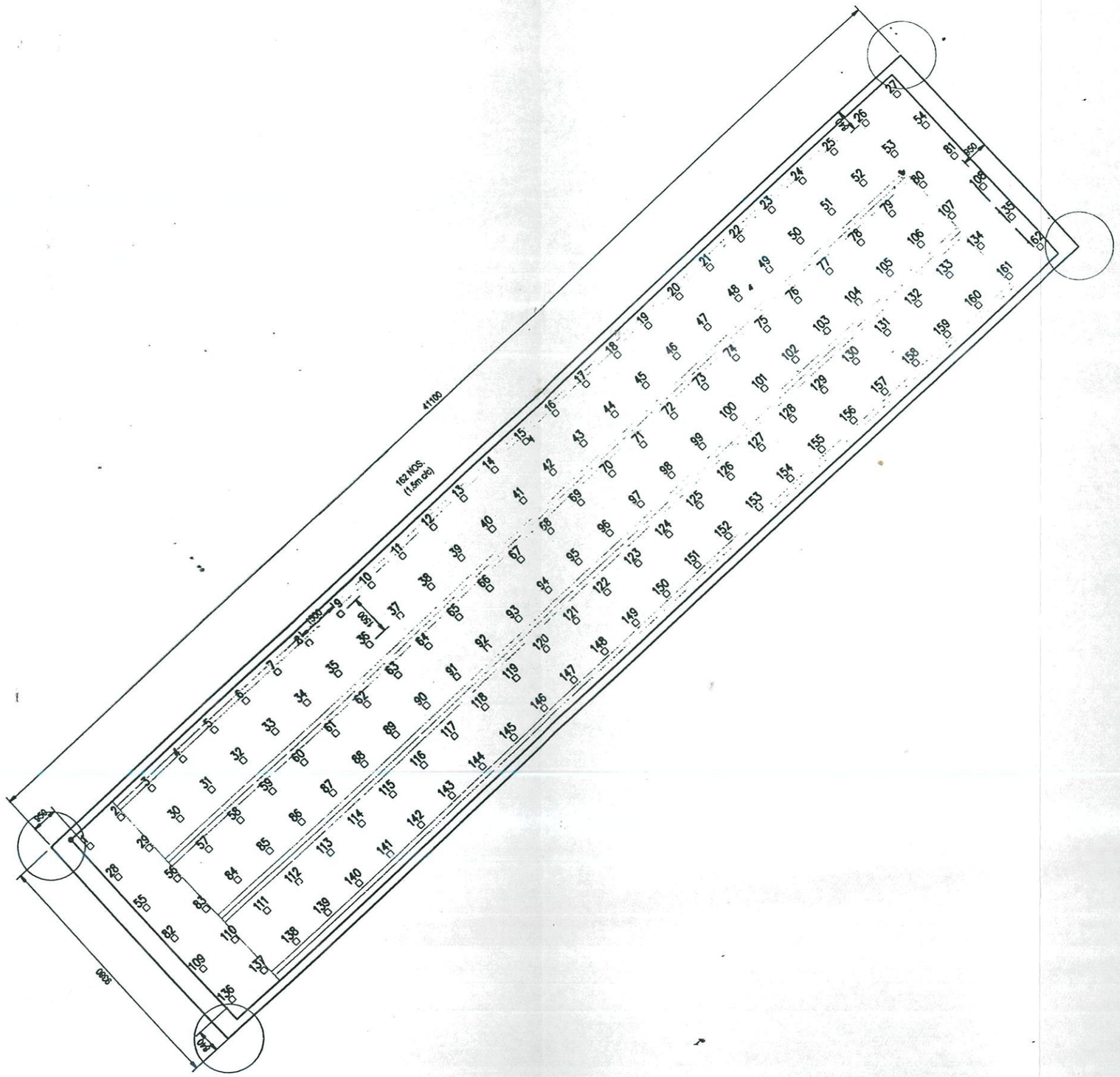
APPENDIX E



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PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT
DAMANSARA - SHAH ALAM
(SEKSYEN A - PUNCAK PERDANA KE KOTA DAMANSARA)

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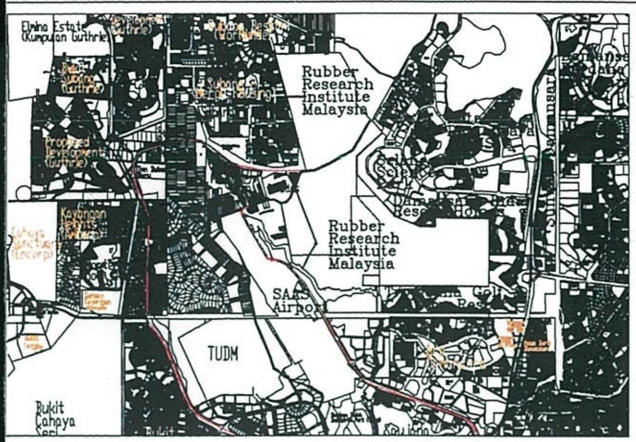

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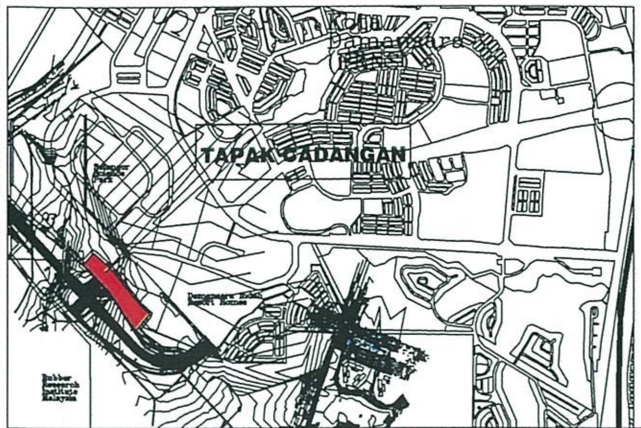

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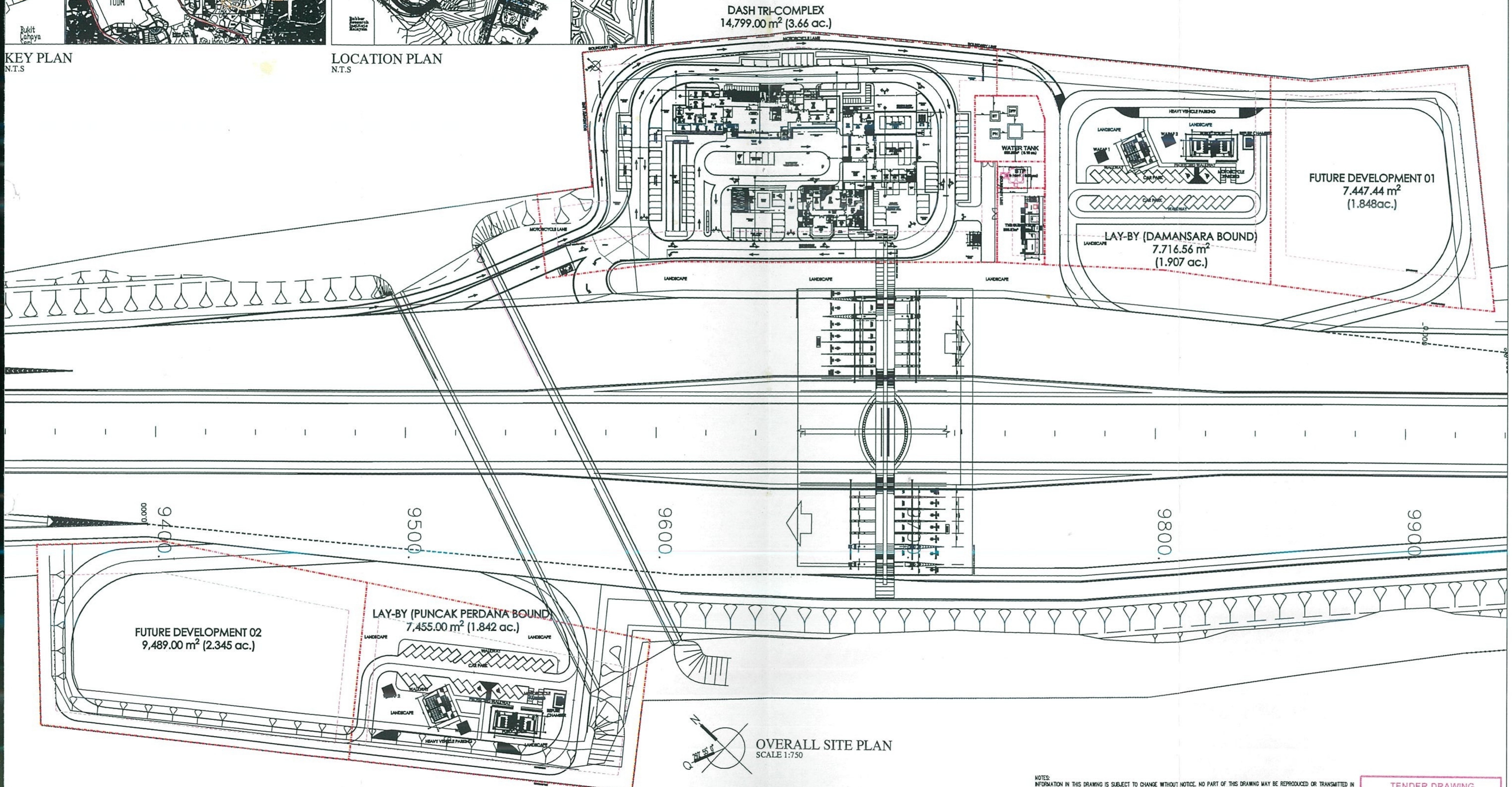

OVERALL SITE PLAN
SCALE 1:750

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APPROVED BY :	EN.AZAM
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REVISION :	

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LEMBAGA ARKITEK MALAYSIA

Ar. Azam Fitri Herman
ARKITEK
No. Pendaftaran LAM : A/A 142

SCALE :
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LEMBAGA LEBUHRAYA MALAYSIA
KERAJAAN MALAYSIA
LEMBAGA LEBUHRAYA MALAYSIA
(MALAYSIAN HIGHWAY AUTHORITY)

KETUA PENGARAH
LEMBAGA LEBUHRAYA MALAYSIA

PROJECT TITLE :
CADANGAN MEMBINA SEBUAH KOMPLEKS PLAZA TOL YANG MENGANDUNGI :-
1.1 TINGKAT BANGUNAN PENGAWASAN (SUPERVISION BUILDING),
2.1 TINGKAT PEJABAT PENTADBIRAN (ADMINISTRATION BUILDING),
3.1 TINGKAT DEPOH PENYELENGGARAAN (MAINTENANCE DEPOT),
4.1 PONDOK PENGAWAL
DI KAWASAN RRIM ARAH KOTA DAMANSARA MUKIM SUNGAI BULOH,DAERAH PETALING BAGI PROJEK PENSWASTAAN LEBUHRAYA BERTINGKAT DAMANSARA-SHAH ALAM.
UNTUK :-
TETUAN PROJEK LINTASAN DAMANSARA-SHAH ALAM SDN BHD.

DRAWING TITLE : OVERALL SITE PLAN

PROJECT NO : AAT/SEL/DASH/12(03)

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SP01

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