DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

ELEVATOR INSTALLATION AT SUNGAI PINANG APARTMENT

Prepared by:

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

FEBRUARY 2022

It is recommended that the report of this practical training provided

By

Nur Zafirah Binti Rosshidi

2019240478

entitled

Elevator installation at Sungai Pinang Apartment

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

Report Supervisor : ________________________________
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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 Manjung District and Land Office for the duration of 15 weeks starting from 27 September 2021 and ended on 7 January 2022. It is submitted as one of the prerequisite requirements of BGN310 and accepted as partial fulfillment of the requirements for obtaining the Diploma in Building.

……………………………………………………….

Name : NUR ZAFIRAH BINTI ROSSHIDI

UiTM ID No : 2019240478

Date : 10 JANUARY 2022

ACKNOWLEDGEMENT

All glory to Allah, the Most Merciful, the Most Compassionate.

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I'd also like to thank the lecturers at UiTM who have taught and nurtured me to be a better student and person. I'd also like to express my heartfelt gratitude to the lecturers who were directly involved in my training. Mrs. Wan Nordiana Binti Wan Ali, Report Supervisor, Dr. Nor Asma Hafizah Binti Hadzaman, Practical Training Coordinator, and Dr. Dzulkarnaen Bin Ismail, Program Coordinator. I appreciate their time, effort, encouragement, and ideas for the success of my training, this report, and the valuable knowledge they have shared this semester.

Finally, I'd like to give special thanks to my beloved parents for their many sacrifices over the years.

ABSTRACT

A mechanical transportation system is essential in a commercial building because it accelerates people's movements and increases the occupants' efficiency and productivity. Sungai Pinang Apartment was selected to investigate further on this mechanical transport. Sungai Pinang Apartment located in Kampung Nelayan, Kampung Sungai Pinang Besar, Pulau Pangkor, Perak. The purpose of this report is to learn how elevator installation is done in Malaysia. The objectives of this report are to investigate the types of elevators, to investigate traction geared elevator installation, and to describe traction geared elevator operation. Therefore, this report focuses on the installation of elevators from start to finish. Elevators were installed as part of the project to make it easier for the villagers to get to their homes. Aside from that, the installation of this elevator will make it easier for the elderly villagers to avoid climbing the stairs, which will tire them out. Finally, the consequences of this project will only provide benefits to the villagers as opposed to disadvantages.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

A mechanical transportation system is essential in a commercial building because it accelerates people's movements and increases the occupants' efficiency and productivity. Transportation is a term used to describe the various methods of getting from one floor to the next in a building. Mechanical transportation of people and equipment around and between buildings is critical in terms of the level of satisfaction provided. This mechanical transportation of people and goods is an energy-consuming service that requires the attention of designers from the beginning stages of building design.

In mechanical transportation systems, there are include lifts (elevators), escalators, and travellators/walkalators. There are lifts (elevators), escalators, and travellators/walkalators in mechanical transportation systems. The use of this transportation in the building is for elderly/old people, handicapped persons, heavy goods, children, public, meant for modern buildings, public buildings, and etc. Mechanical transportation is required in all buildings with more than three storey. The minimum standard of service for elevators is one elevator per four-storey, while the minimum walking distance to access an elevator is 45 m. Last but not least, floor space estimates and vehicle capacity can be based on 0.2 m^2 per person (Munaaim, 2009).

For this case study, Sungai Pinang Apartment was selected to investigate further on this mechanical transport. Sungai Pinang Apartment located in Kampung Nelayan, Kampung Sungai Pinang Besar, Pulau Pangkor, Perak. This project is implemented by Petrogaz Engineering Sdn Bhd under the order of the Pejabat Daerah dan Tanah Manjung. Sungai Pinang Apartment is located near the sea. The scope of this task covers several mechanical transportation systems namely elevators as the main transportation to be used by villagers or outsiders visiting their relatives.

The way these three types of mechanical transportation systems transfer people or cargo to another floor differs. An elevator, for example, is a room-type elevator that takes passengers up and down between floors of a building while accommodating numerous people at once (Vintelev, 2017). An escalator is a type of elevator that transports people between levels of a building (Vintelev, 2017). Finally, a travellator is a slow conveyor belt that, like an escalator, carries passengers horizontally or inclined (askDifference, 2019).

The pros of this method are that it requires a less powerful motor to turn the sheave due to the gear reduction. However, when compared to most gearless lifts, the lift rates are slower (Ascension, 2018). There are many different kinds of mechanical transportation systems, but the aim is to learn how traction geared elevators are installed in Malaysia.

1.2 Objectives

i) To investigate types of elevators.
ii) To investigate traction geared elevator installation.
iii) To describe traction geared elevator operation.

1.3 Scope of Study

The elevator was installed at Kampung Nelayan in Kampung Sungai Pinang Besar, Pulau Pangkor, Perak. The purpose of this project is to explain why elevators are needed in Sungai Pinang Apartment. The type of elevator used is a traction geared elevator. The project teaches about the several types of elevators that are used, how they are installed, and how they operate. This report does not consider the costs that must be considered before beginning the project, nor does it consider the number of labourers required.

1.4 Method of Study

Data for this project was gathered through interviews with supervisors in his office. The interview lasts between 10 and 20 minutes. The interview was documented using notes and audio recorders.

The following method is document reading. The supervisor provided a tender book to read in order to gain a better understanding of the ongoing project. Moreover, while the project was in progress, the supervisor provided slides with pictures.

In addition, the supervisor gave the opportunity to follow him to a meeting about the elevator installation project that is being implemented at Kampung Nelayan in Kampung Sungai Pinang Besar, Pulau Pangkor, Perak.

Figure 1: Meeting about the project

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

The district office is a vital district administrative institution in the national administrative machinery because it is at this stage that the image of the government is formed and the efficacy of the government plan is tested by the people. The district office, as the primary grassroots administrative organization, serves as a liaison between the county, state, and federal levels. The primary responsibility is to coordinate and implement district development project programs following the National development policy, to improve living standards and incomes.

In addition to serving as the lead planner, the district office supports development by serving as a development coordinator, agent of change, assisting the administrative system in achieving excellence, and establishing a positive work culture. Finally, the implemented administrative system is more in the form of power centralization or power division, and it is subject to several rules and laws that apply from time to time.

2.2 Company Profile

The administration system in the Pejabat Daerah dan Tanah Manjung is divided into three administrative layers, the first or upper layer is the District Level, the second layer is the Residential Level and the third layer is the Rural Level.

i) Administration at the District Level

Led by the District Officer who acts as the Head of Manjung District Administration. Assisted by:

• Chief Assistant District Officer (Development) with two Assistant District Officers (Development)

• Chief Assistant District Officer (Land) with three Assistant District Officers (Land)

• Assistant District Officer (Management Services)

District and Land Office Administration

The Manjung District and Land Administration are headed by a District Officer, an Administrative and Diplomatic Officer Grade M54. This administration is divided into three (3) parts:

• Land Administration Division

• District Development Division (Rural Development Division)

• District Management Division

Administration Center

There are 4 Government Offices located in the complex as follows:

• Manjung District and Land Office

• Manjung District Religious Office

• Manjung District Agriculture Office

• Internal Security Council Division

ii) Administration At the Residential Level

In terms of administration, the administration of each mukim is headed by the Head of Mukim. Manjung district and is divided into five mukims, namely:

• Mukim Lumut

• Mukim Sitiawan

• Mukim Lekir,

• Mukim Beruas

• Mukim Pengkalan Bharu

iii) Administration At the Rural Level

Usually, the administrative center of a village is in the office which is part of the Public Hall building of the main village of the JKKK. This office serves as a meeting place for MPKK.

Customers

Customers consist of: -

• Members of Manjung District and Land Officials

• Y.B. State Assemblyman and Member of Parliament

• Government department in Manjung district

• The public or landowners.

• Communal work is to encourage joint participation by the villagers.

• State Economic Planning Unit and State Development Office.

• Contractors and suppliers.

• Law firms.

• Licensees and permits.

Objectives of the Organization

i. Enforce and administer National Land Laws and State Land Regulations.
ii. Collect and enforce various Land Revenue, Taxes, Licenses, and other fees.
iii. Plan and carry out Land Socio-Economic programs.
iv. Coordinate departmental development activities under the National Development Policy.
v. To provide and improve facilities - both physical and socio-economic infrastructure - for the people of Manjung District, particularly in rural areas.
vi. Improving society's condition to achieve integrated and balanced human development.
vii. Improving the socio-economic status of the most vulnerable people.

Vision and Mission of Pejabat Daerah dan Tanah Manjung

Vision: To make Manjung District one of the most developed, leading, and well-known districts in the country, particularly in the fields of tourism and maritime development, as well as internationally and globally.

Mission:

i. To ensure the quality and comprehensive development of physical and infrastructure in various socio-economic fields in both urban and rural areas.
ii. To provide adequate and equitable employment and economic development opportunities to the local community, regardless of race.
iii. Creating a society that is progressive, developed, competitive, and highly virtuous, and caring.
iv. To ensure that the beauty of nature and the environment is always preserved and not exploited to the greatest extent possible.

2.3 Company Organisation Chart

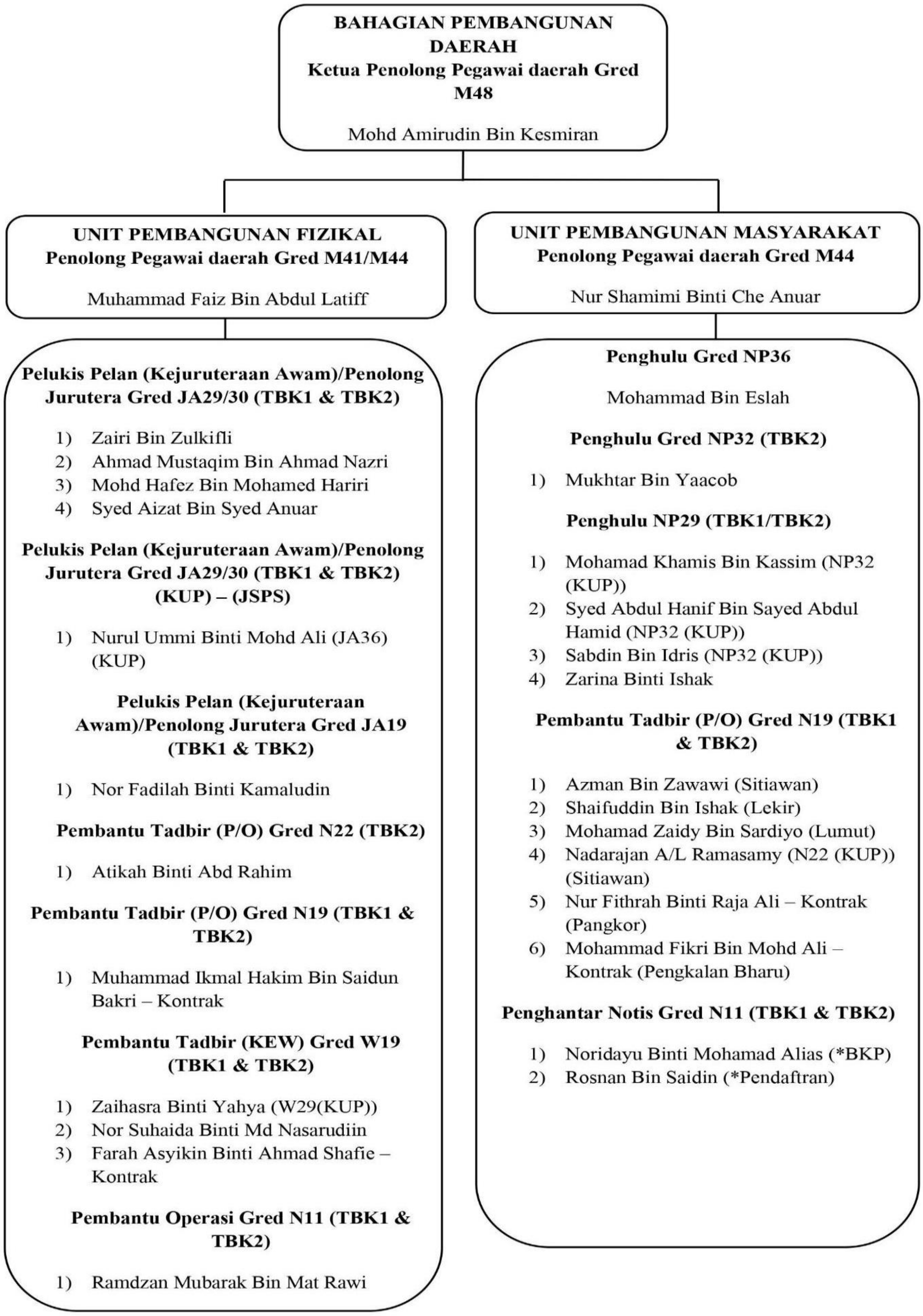


Figure 2: Company Organisation Chart

2.4 List of Projects

2.4.1 Completed Projects

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Maintenance of pavilion multipurpose hall, Sitiawan	RM35,000.00	11/03/2021	24/03/2021	Two weeks	HBI LEKIR ENTERPRISE
2.	Maintenance of takraw court in Kampung Che Puteh, Beruas	RM15,000.00	16/03/2021	05/04/2021	Three weeks	IDAMAN AZHA ENTERPRISE
3.	Repair the public hall of Kampung Pasir Panjang	RM15,000.00	16/03/2021	05/04/2021	Three weeks	INDAH ALWAANY ENTERPRISE
4.	Upgrading the public hall of Kampung Dato Seri Kamarudin, Seri Manjung	RM30,000.00	16/03/2021	05/04/2021	Three Weeks	FAZZLI TRADING & CONSULTANT
5.	Upgrading the public hall of Kampung Paya Ara, Beruas	RM40,000.00	16/03/2021	12/04/2021	Four weeks	FLYRNZ SUPPLY & SERVICES
6.	Maintenance of residential quarters for district office staff in Lumut, Perak	RM50,000.00	08/06/2021	29/06/2021	Two weeks	ALFA BINA ENTERPRISE
7.	Works to upgrade the store room to the digital screening room of Sekolah Kebangsaan Sungai Batu, Pantai Remis	RM7,500.00	29/07/2021	12/08/2021	Two weeks	ANB CONSTRUCTION ENTERPRISE

8.	Upgrading the public infrastructure of the Amanjaya vaccination center (PPV), Lumut (installing culverts and sidewalks and building fences	RM10,000.00	03/08/2021	16/08/2021	Two weeks	DON 7 CONSTRUCTION
9.	Upgrading works at Sekolah Kebangsaan Batu 10, Manjung, Perak	RM19,000.00	11/08/2021	24/08/2021	Two weeks	EMRON ENTERPRISE
10.	Upgrading of B40 and asnaf houses in Kampung Teluk Pulai and Kampung Batu 14, Lekir, Manjung	RM17,000.00	11/08/2021	07/09/2021	Four weeks	USTB SERVICES
11.	Upgrading the Pangkor Island dental clinic to be used as a vaccination center (PPV) in Perak	RM5,000.00	13/09/2021	27/09/2021	Two weeks	RAHMAN TEH ENTERPRISE SDN BHD
12.	Upgrading of B40 and asnaf houses in Kampung Batu 15, Lekir, Perak	RM12,000.00	23/09/2021	06/10/2021	Two weeks	HALIM LC RESOURCES

2.4.2 Project in Progress

No.	Project Title	Project Value	Start Date	Estimated time of Completio n Date	Project Duration	Client
1.	Redevelopment of Kampung Nelayan in Kampung Sungai Pinang Besar, Pulau Pangkor, Perak	RM11,665,252.10	17/10/2018	26/02/2022	Three years four months five days	PETROGAZ ENGINEERING SDN BHD

CHAPTER 3.0

CASE STUDY

3.1 Introduction of Case Study

Sungai Pinang Apartment is a development project in Kampung Nelayan, Kampung Sungai Pinang Besar, Pulau Pangkor, Perak. The project starts on 17 October 2018 and will be completed on 26 February 2022. The project takes three years four months and five days to be fully completed. This is most likely related to the Covid-19 factor, which is expected to strike Malaysia in early 2020. As a result, the project was required to be postponed due to security concerns.

This project was made because previously the land was a squatter area occupied by the villagers. This demonstrates that the area is disorganized and lacks inadequate infrastructure. After the Sungai Pinang Apartment project, it will make it easier for the villagers to pass by because the roads and drains in the area will be improved. Firefighters are also easier to pass in case of any emergency in the area. In addition, the piping system in the area will also be renewed.

The project is surrounded by villagers' homes and vacant village halls. This Sungai Pinang Apartment is also close to the sea. Networks in the area receive less signal than those in urban areas. Culvert pipe installation, door, and lock installation, elevator installation, ground leveling, and shop lot mosaic installation are some of the activities carried out in the project area.

PROJEK : PEMBANGUNAN SEMULA PERKAMPUNGAN NELAYAN DI KAWASAN KG. SG.PINANG BESAR, PULAU PANGKOR PERAK (FASA 2)			
KOS PROJEK	KESELURUHAN:RM 31,907,060.00		
	KONTRAK:RM 11,607,104.52 (termasuk GST)		
PERUNTUKAN 2021	RM1,000,000.00 (FASA 2 & 3)		
PENYALURAN 2021	RM1,000,000.00 (FASA 2 & 3)		
PERBELANJAAN 2021	RM1,686,532.93		
AGENSI PELAKSANA	PEJABAT DAERAH DAN TANAH MANJUNG		
KAEDAH PEROLEHAN	KONVENSIONAL PERUNDING/ REKA BINA		
AGENSI PEMILIK	UNIT PERANCANG EKONOMI NEGERI PERAK		
KONTRAKTOR	PETROGAZ ENGINEERING SDN BHD		
TARIKH MULA	17 OCT 2016		
TARIKH SIAP ASAL	6 MAC 2018		
TARIKH SIAP SEMASA	28 FEBRUARI 2021		
TARIKH SIAP SEBENAR	28 FEBRUARI 2021		
STATUS PELAKSANAAN	PEMBINAAN (SAKIT/LJ/BM/IJ/DJ)		
EOT / LAD (JIKA TERLIBAT)	EOT 1: 28 JUL 2018 EOT 2 : 19 DEC 2018, EOT 3 : 31 AUG 2019, EOT 4: 31 APR 2020, EOT 5: 15 OCT 2020, EOT 6: 28 FEB 2021		
PRESTASI	FIZIKAL (%)	KEWANGAN	
		RM	(%)
• JADUAL	100	11,026,749	99
• SEBENAR	89	8,947,873.27	77.09

Figure 3: Project Signboard

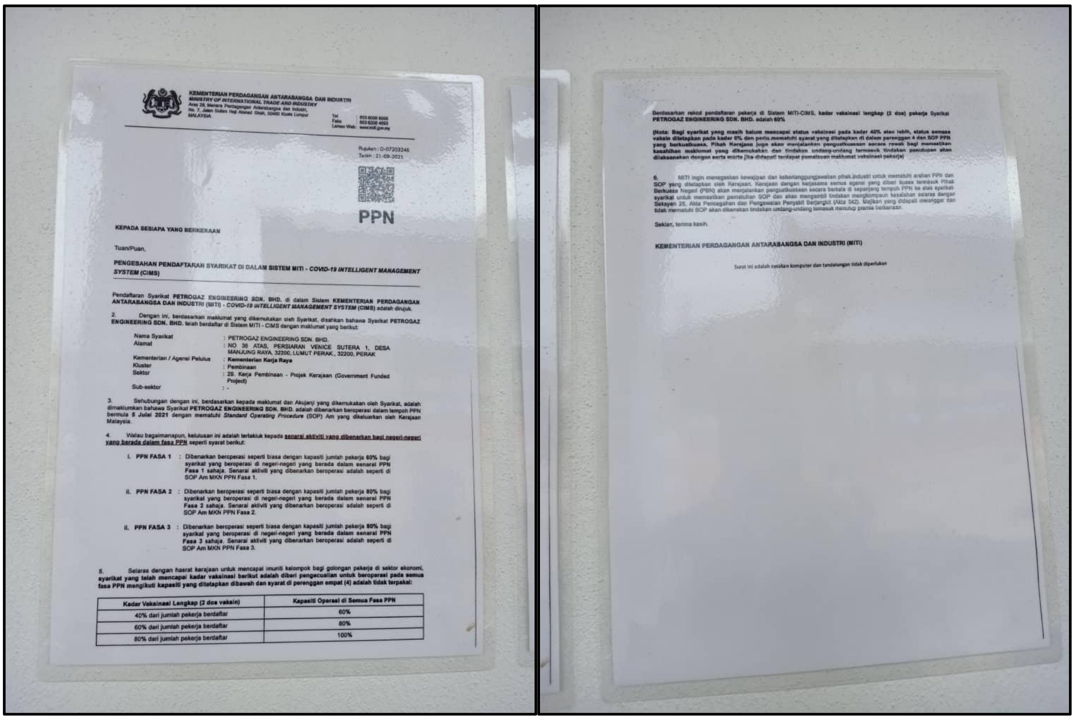


Figure 4: MITI letter from the contractor

Figure 5: Conditions around the project site

3.2 Types of elevators at Sungai Pinang Apartment

Sungai Pinang Apartment uses traction geared elevator as a mechanical transportation system. Traction geared elevators have a gearbox connected to the motor that drives the wheel that moves the ropes. Traction geared elevators can travel at speeds of up to 500 feet per minute. A traction geared elevator has a maximum travel distance of about 250 feet. Traction geared elevators are in the middle of the price spectrum in terms of initial cost, ongoing maintenance, and energy consumption (Archtoolbox, 2021). However, the lift rates are slower than those of most gearless lifts. These lifts typically travel at speeds ranging from 125 to 500 feet per minute. In addition, their maximum car-load capacity can reach 30,000 pounds. For stopping the elevators at the desired floors, the system employs electrically controlled brakes between the motor and gear unit (Ascension, 2018).

AC or DC electric motors power traction geared machines. Worm gears are used to control the mechanical movement of elevator cars by "rolling" steel hoist ropes over a drive sheave attached to a gearbox driven by a high-speed motor. For many decades, a DC hoist motor powered by an AC/DC motor-generator (MG) set was the preferred solution in high-traffic elevator installations to allow accurate motor speed control, accurate levelling, and passenger comfort. The MG set typically powers the relay control of the elevator. This has the added benefit of electrically insulating the elevator from the rest of the building's electrical system and eliminating temporary spikes in the building's power supply caused by the building's power supply. It eliminates the malfunction of other electrical equipment due to the start and stops of the motor and the arc of the relay contacts of the control system (Colley, 2020).

Traction lifts use less energy than other types of lifts. This is because traction lifts are counterbalanced and use less energy as a result of the counterbalancing effect (Platform, 2021). Furthermore, traction elevator ropes and sheaves must be checked for wear regularly. As they wear, the traction between the sheave and the cables decreases, and slippage increases, reducing efficiency and becoming dangerous if left unchecked. Height restrictions on traction elevators are determined by the length and weight of the cables or ropes. New materials, such as carbon fiber, that are stronger and lighter, will allow traction elevators to reach new heights (Archtoolbox, 2021).

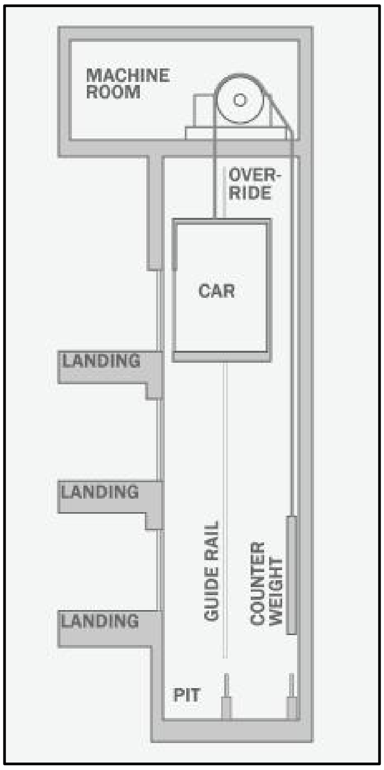


Figure 6: Traction Geared Elevator

Traction at this apartment uses a single-speed center opening system door. Single-speed center opening system doors are extremely normal in elevators found in pretty much every building. This sort of door comprises two panels that compromise and slide open horizontally (Eric, 2020).

Figure 7: Single-speed center opening system door at Sungai Pinang Apartment

The pros of the traction lift are that it is faster than the hydraulic lift. This will allow the traction system to be used in tall, modern buildings of the 21st century. Traveling in the traction elevator is also smooth. The counterweight balances the load on the truck, which also improves the energy efficiency of the traction system. The traction lift's cons are its high cost. Installation costs between 15% and 25% more than a hydraulic system. Because the machine's controls are located in the shaft headroom, traction lifts can be difficult to maintain. This area may be difficult to reach. However, if a magnetic synchronous motor replaces the machine room, a superior control mechanism will be provided. It also illuminates the lift shaft process, making it easier to maintain and safer to use. This will be a good, albeit costly, long-term lifting option (Platform, 2021).

3.3 Installation of traction geared elevator at Sungai Pinang Apartment

3.3.1 Installation

The contractor begins by inspecting the hoistway, the entrance to the hoistway, the pits, and the elevator equipment room. The contractor examines all critical dimensions, as well as the support structure and working environment. Any conditions that may affect the final installation or operation of the elevator are reported in writing by the contractor, with a copy to the architect. The elevator contractor is responsible for taking field measurements for the control room, lift route, and entrance aperture prior to submitting the design. After the shop design is approved, the elevator contractor is responsible for installing the equipment without making any changes in the field. The elevator plant must be installed completely and in first-rate condition, with all components properly adjusted and all operating mechanisms and controls in working order. Installation must adhere to authorized store drawings as well as outlined laws, regulations, rules, codes, and industry standards.

The elevator components are arranged in the engine room, control room, or engine room so that they can be moved for repair or replacement with the least amount of disruption to equipment and other components. Following that, contractors collaborate with other trades to properly coordinate elevator work to avoid construction delays, timing, and sequence of work. The contractor installs machinery, guides, controls, vehicle and hall equipment, and accessories to ensure a quiet and smooth installation free of side sway, oscillation, and vibration. The contractor also mounts rotating and vibrating elevator components and equipment on vibration absorption mounts, which are designed to effectively limit vibration transfer to the structure and thus reduce structural noise sources from the elevator system. Furthermore, the operating parts of the lubrication system as specified by the manufacturer. The contractor arranges the installation of both the hoistway and the car input. Finally, on all landings, the contractor installs a threshold parallel to the finished floor.

3.3.2 Wiring

Provide and install all cabling required to connect the elevator control panel to the hoist way's operational buttons, switches, and signals, as well as any electrical equipment on the car, as part of this Section's work. Except for traveling cables, which can be placed in "liquid-tight" flexible conduit for short lengths, wiring must be neatly and orderly organized in conduit, electrical metallic tubing, or metal wire ways. Traveling cables must be of the highest quality for service and must be installed in such a way that they provide the automobile with the proper size loop. The moving cables outside braid must be fire-resistant. Any structural surface that the moving wires come into contact with while the elevator is moving must be protected from wear. Traveling cables must be encased in conduit from the bottom to the top of the vehicle. To avoid damage to the moving wires' outer coating, the conduit must be tightly fastened and attached with rubber bushings. Following the installation of elevator equipment, three complete sets of wiring schematics should be submitted to the owner as a part of a comprehensive Operations and Maintenance manual submission.

3.3.3 Adjusting

After the wiring work is completed, the elevator is adjusted for proper operation according to the manufacturer's or installer's instructions, and the elevator is set for smooth acceleration and deceleration of the car so that the passengers are not uncomfortable. Adjust the door to prevent it from opening on a corridor side landing unless the car is stopped there or in the leveling zone and stops there. Automatic floor leveling features adjustment within 1/4 inch of the landing on each floor. Minor damage to completion is repaired by the contractor as directed by the manufacturer or installer and as authorized by the architect. Finally, the contractor removes and replaces any damaged components determined by the architect to be unsalvageable.

3.3.4 Cleaning and Painting

Following that, clean elevators as soon as possible after installation, in accordance with the manufacturer's or installer's recommendations. To avoid damaging the finish, use gentle cleaning products and procedures. Unless otherwise specified, the elevator contractor must coat any exposed metal provided under these requirements after installation. The machine room floor, pit floor, unused rails, rail brackets, pit channels, fascia, and dust covers must all be cleaned and painted before the owner accepts the modifications.

3.3.5 Field Quality Control

After the elevator installation is nominally complete and before allowing the elevator to be used, the contractor performs formal acceptance testing as required and suggested by governing regulations and authorities (temporarily or permanently). Any formal inspections of the elevator installation that are scheduled should be communicated to the contractor, owner, and architect. It is necessary to give at least 48 hours' notice.

3.3.6 Protection

The contractor is responsible for protecting the elevator installation after it has been built. Covers, barriers, devices, signs, or other measures or processes must be used to protect elevator work from damage or degradation. Protective precautions will be maintained throughout the remainder of the construction phase. If items cannot be refinished in the field, return them to the shop for repair and thorough refinishing, or replace them with new ones. All work must be clean and defect-free on the Date of Substantial Completion.

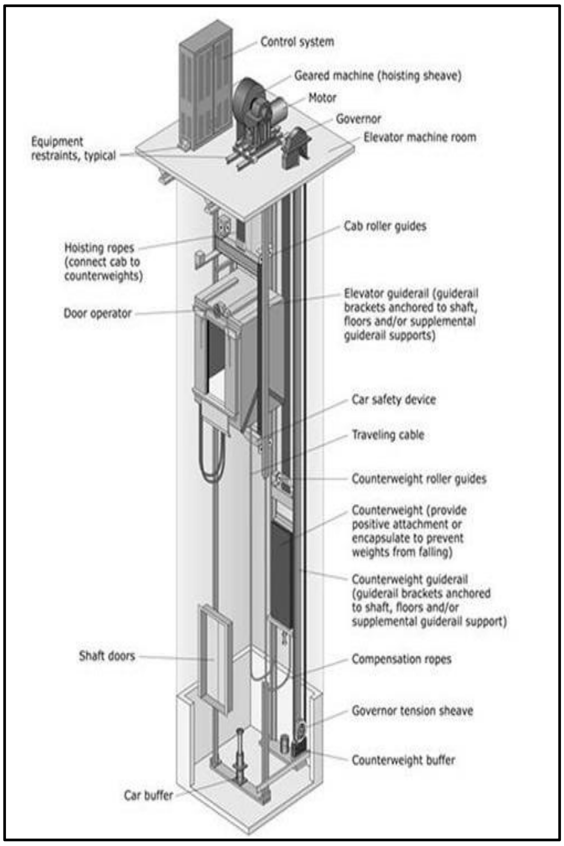
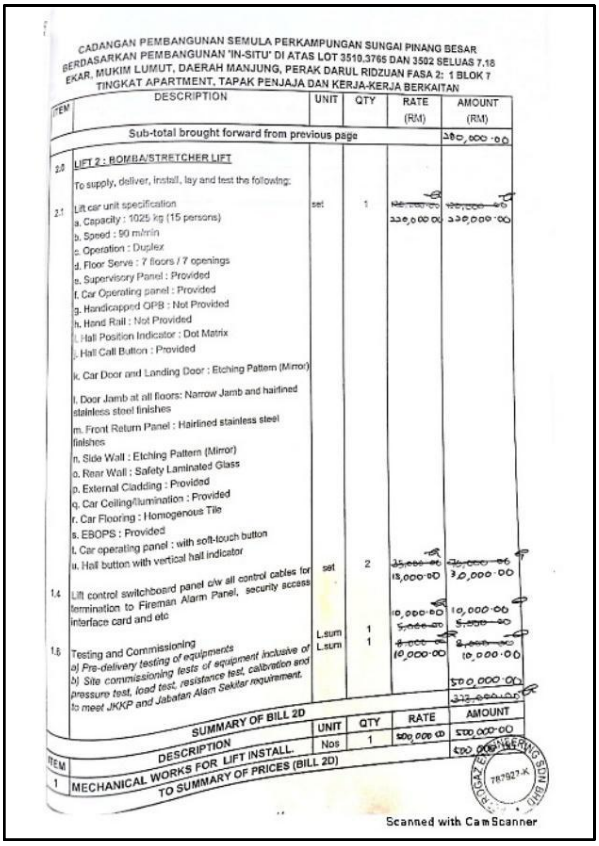


Figure 8: Traction Geared Elevator

Figure 9: The installation of Traction Geared Elevator is currently underway



CADANGAN PEMBANGUNAN SEMULA PERKAMPUNGAN SUNGAI PINANG BESAR BERDASARKAN PEMBANGUNAN 'IN-SITU' DI ATAS LOT 3510,3765 DAN 3502 SELUAS 7.18 EKAR, MUKIM LUMUT, DAERAH MANJUNG, PERAK DARUL RIDZUAN FASA 2: 1 BLOK 7 TINGKAT APARTMENT, TAPAK PENJAJA DAN KERJA-KERJA BERKAITAN

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Sub-total brought forward from previous page				280,000.00
2.0	LIFT 2 : BOMBA/STRETCHER LIFT To supply, deliver, install, lay and test the following:				
2.1	Lift car unit specification a. Capacity : 1025 kg (15 persons) b. Speed : 90 m/min c. Operation : Duplex d. Floor Serve : 7 floors / 7 openings e. Supervisory Panel : Provided f. Car Operating panel : Provided g. Handicapped OPB : Not Provided h. Hand Rail : Not Provided i. Hall Position Indicator : Dot Matrix j. Hall Call Button : Provided k. Car Door and Landing Door : Etching Pattern (Mirror) l. Door Jamb at all floors: Narrow Jamb and hairlined stainless steel finishes m. Front Return Panel : Hairlined stainless steel finishes n. Side Wall : Etching Pattern (Mirror) o. Rear Wall : Safety Laminated Glass p. External Cladding : Provided q. Car Ceiling/Illumination : Provided r. Car Flooring : Homogenous Tile s. EBOPS : Provided t. Car operating panel : with soft-touch button u. Hall button with vertical hall indicator	set	1	~~[illegible]~~ 220,000.00	~~[illegible]~~ 220,000.00
1.4	Lift control switchboard panel c/w all control cables for termination to Fireman Alarm Panel, security access interface card and etc	set	2	~~35,000.00~~ 15,000.00	~~70,000.00~~ 30,000.00
1.5	Testing and Commissioning a) Pre-delivery testing of equipments b) Site commissioning tests of equipment inclusive of pressure test, load test, resistance test, calibration and to meet JKKP and Jabatan Alam Sekitar requirement.	L.sum L.sum	1 1	10,000.00 ~~5,000.00~~ ~~8,000.00~~ 10,000.00	10,000.00 ~~5,000.00~~ ~~8,000.00~~ 10,000.00
					500,000.00 ~~3[illegible]~~

SUMMARY OF BILL 2D

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	MECHANICAL WORKS FOR LIFT INSTALL.	Nos	1	500,000.00	500,000.00
	TO SUMMARY OF PRICES (BILL 2D)				500,000.00

Figure 10: Bill of Quantities of Traction Geared Installation at Sungai Pinang Apartment

3.4 Operation of traction geared elevator at Sungai Pinang Apartment

3.4.1 Traction Drive/Roping Elevator

The traction drive is the method of converting the system's input mechanical power (shaft) into functional mechanical power (the vertical movement of the elevator). The traction force between the traction drive and the rope is initiated by the abrasion between the ropes and the cut on the pulley. The traction drive transfers power to the elevator car and counterweight. When the traction drive was rotated, this occurred. The only thing that power does is move the unbalanced load between the elevator and the counterweight.

Elevators operate automatically by pressing the buttons on the control panel labeled with the landing levels served. At each landing, it is close to the elevator door frame. When a push button is pressed on a landing station, it will light up. This indicates that a call has been sent to the control panel, which will direct the car to that specific landing. A time delay, non-interference feature is included in the control mechanism to allow time for the elevator door and hoistway doors to open and close before the elevator is restarted. To connect the motor/gear reducer, elevator, and counterweight, a roping system is used. There are numerous types of arrangements that can be used. The elevator car and counterweight are both connected to free-moving pulleys. Sungai Pinang Apartment used a single wrap 1:1 roped.

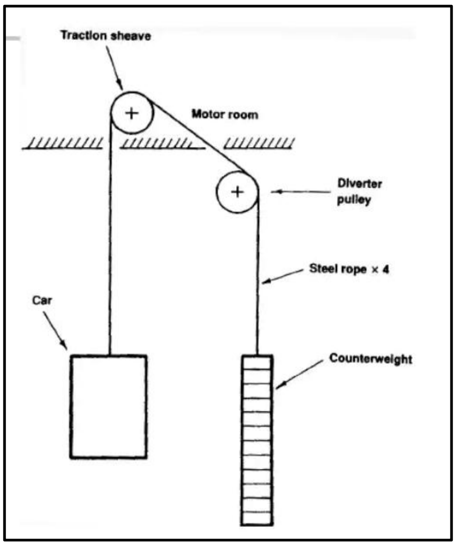


Figure 11: Single wrap 1:1 roped

3.4.2 Gears

A motor and, more commonly, a worm gear reducer system controlled the elevator. A worm gear system consists of a worm gear, commonly referred to as the worm, and a larger round gear. Also known as a worm wheel. These two gears, which are vertically rotated to each other, not only stop the traction pulley's rotational speed but also change the level of rotation. This gear increases the output torque and can lift larger objects for a given pulley diameter by terminating the speed with the use of a gear reducer. Worm gears are preferred over other types of gearing due to their density and ability to withstand higher shock loads. It is also simple to connect to the motor shaft, sometimes with the help of a coupling.

The elevator machine contains a motor component known as a DC motor or an AC motor. The starting torque of a DC motor is high, and speed control is simple. Meanwhile, the AC motor is more commonly used because it is powerful and easy to operate. The motor is chosen based on the elevator's design. The power required to get the car moving is determined by the ability to overcome static or motionless dragging. Also, to accelerate the mass from rest to full speed. Considerations must be made when selecting an acceptable motor with good speed regulation and excellent torque starts.

3.4.3 Brakes

The most common elevator brake is composed of a compressible spring joining, brake shoes with linings, and an electromagnet connection. The spring compresses the brake shoes, causing them to grip the brake drum and generate braking torque. When the electromagnet is not activated, this process occurs. For the brake release, the magnet can use a horizontal force. It can be accomplished via a linkage system or directly on the operating arms. The break is pulled away from the shaft, resuming the elevator's momentum.

Within the breaks, a material with a high coefficient of traction, such as zinc bonded asbestos, is used to improve stopping ability. A material with an excessively high coefficient of traction can cause the car's motion to become uncontrollable. That means the engineer must carefully select the material. Typically, the geared machine's productivity for the motor and gearbox erection is 60%.

3.4.4 Safety Mechanism

There are buffers in the pit. These buffers absorb electrical shock and prevent the car from collapsing. Guide rails are installed on the shaft. These guide rails keep the elevator in place and prevent it from swaying. The car/counterweight is attached to guide rails, which provide a smooth ride. The elevator's governor has arrived. When the elevator freefalls or travels too quickly, this mechanism is activated. The governor has its cable and pulley system. The main tension sheave is located at the shaft's base. If the elevator travels too quickly, a mechanism inside the governor trips, causing the elevator to stop. Flyweights are the name given to this mechanism. If the elevator moves too quickly, the flyweights will seize the rachets and the elevator will come to a halt (Elevators, 2017).

3.4.5 Operation

A traction elevator car is supported by steel cables. These cables wind around a drive sheave at the shaft's apex, which houses the machine room. The sheave is driven by an electric motor, which spins it in one direction or the other. The elevator's movement is directed by the elevator's controller. Doors can be moved up and down, as well as opened and closed. The elevator's counterweight is on the other side of the cables. The counterweight enables elevators to use less energy while providing passengers with a smoother ride. When fully loaded, the counterweight weighs half the weight of an elevator car. The elevator's deflector sheave runs on the cables for the counterweight, and this sheave reduces the vibration of the car and counterweight (Elevators, 2017).

3.4.6 Counterweight

When the lift begins to fall, the counterweight begins to rise, and vice versa. For example, a lift from the ground floor to the 10th floor requires 1000 KJ of energy. This indicates that they have connected a counterweight at the other end of the cables. Because the counterweight is pulling people up, the electric motor above required less energy to lift people. As a result of the elevator consuming less power, instead of 1000 KJ, it would require less energy, such as 500 KJ.

A counterweight weighs nearly half the weight of a fully-loaded car. Because of the counterweight, the car is easier to control. The motor must raise and lower the car in the same way that a swing does. This makes lifting someone's weight much easier than lifting them in our arms. A heavily loaded elevator will also be difficult to pull up but will race down to the ground as it descends.

3.4.7 Door

The elevator car's automatic doors are important and very convenient for handicapped people. The typical automatic door system consists of a motor connected to a long metal arm attached to the door. The door can then be moved back and forth along the metal rail. The motor turns the wheel, which causes the first arm to rotate. The second long metal arm then rotates, indicating the process of closing or opening the door. The door is composed of two panels that close in when the door opens and expand when it closes. In addition, many elevators have a motion or ultrasonic sensor that prevents the door from closing if someone is in the way.

Figure 12: Traction Geared Elevator door panel

3.4.8 Safety Brakes

What if the cable that is holding this thing snaps? There's nothing to be concerned about. A variety of safety systems prevent an elevator car from crashing to the floor if the cable snaps. Each elevator car was suspended between two vertical guide rails with strong metal teeth embedded in them. There was a spring-loaded with hooks attached to the top of each car. If the cable snapped, the hooks would have sprung outward and compressed into the metal teeth in the guide rails, securely locking the car in place (Chris, 2020).

A hoist and pulley system raises and lowers the elevator section. It causes the counterweight to move. All of the liftings are done by a cable. It is wrapped around several pulleys as well as the main twist drum. At the top of the elevator car, there is a simple mechanism consisting of spring-loaded arms and pivots. If the main cable snaps, the springs pull out two strong bars known as pawls. On either side, they will lock into vertical racks of upward-pointing teeth. This device will keep the elevator securely in place (Chris, 2020).

3.4.9 The Elevator Car

Each elevator is part of a bank of elevators. One or more elevators can be found in an elevator bank. A traveling cable connects the elevator car to the controller. It is the link that connects the car to the controller. The car has a cartop. It is accessed through a drop key. Inspectors can ride the elevator using the controls on the cartop. The door is controlled by a door operator, which also includes sensors to prevent the doors from closing on someone (Elevators, 2017).

CHAPTER 4.0

CONCLUSION

In conclusion, this report describes the type of elevator system used in the Sungai Pinang Apartment building, which is a traction geared elevator. The machine room is on the terrace's uppermost level, and the car is lifted by ropes that pass over a wheel attached to an electric motor above the elevator shaft. It is appropriate for high-rise buildings because it uses less energy than hydraulic elevators. After all, the motor is only used to overcome friction. The older models that use direct current electricity are the most inefficient because it is easy to control the speed with DC. Finally, this report provides a thorough understanding of how the traction geared elevator system operates. As a result, the knowledge gained from this project can be applied to future elevator projects.

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