

**DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND
SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

**CONSTRUCTION AND MAINTENANCE OF PUBLIC
FACILITIES:
BUS STOP**

**PREPARED BY:
ZAIDATUL SALWA BINTI HASSAN
2019279432**



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(PERAK)**

FEBRUARY 2022

It is recommended that the report of this practical training provided

By

Zaidatul Salwa Binti Hassan

2019279432

entitled

**Construction and Maintenance of Public Facilities:
Bus Stop**

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

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**DEPARTMENT OF BUILDING
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(PERAK)**

FEBRUARY 2022

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 session that I underwent at Wakriz Engineering Sdn Bhd for duration 20 weeks starting from 23 August 2021 to 7 January 2022. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

.....

Name : Zaidatul Salwa Binti Hassan
UiTM ID No : 2019279432
Date : 17 September 2021

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Last but not least, I would like to mention my heartfelt gratitude to my beloved parents for their supportive encouragement and sacrifices over the years.

Thank you so much.

ABSTRACT

A bus-stop is an important component of urban transportation facilities that defines the start (origin) or end (terminating) of a line for the transportation system. Therefore, this report will explain and discuss about how the construction and maintenance of bus stops based on the real- time observation and according to proper construction laws. This report was conducted to fulfil the practical training requirements in Diploma in Building. The objective of this report is to provide more thorough understanding of bus stop construction aspects. To provide a clear understanding in estimating quantities of the whole project. The construction and maintenance of the facilities will be prescribed by the requirements in the guideline of building and construction process.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

The terms ‘public facilities’ refers to institutional responses to basic human needs such as street, plaza, pedestrian mall and any improvements to a street, pedestrian mall including street furniture, parking utility line, building and access routes to any of foregoing designed and dedicated to use by the public generally. One of the facility that will be discussed and explain in this report is bus stop.

There are three designs of bus stop, firstly, in-lane sidewalk stop, median stop and on-street terminal. The bus stop constructed in this study case is in-lane sidewalk stop. This design is commonly constructed on the sidewalks due to the low economic cost and speed of construction. Furthermore, the design is simple to replicate on both small and large streets where traffic is mixed or not always separated by barriers. Therefore, this case study will explain the maintenance of bus stops based on the real-time observation.

1.2 Objective of case study

- i. To provide a clear understanding in estimating quantities.
- ii. To determine the extent of damage to existing facilities.
- iii. To observe more thorough understanding of bus stop construction aspects.

1.3 Scope of Study

The case study was conducted in the vicinity of Taman Wilayah, Kuala Lumpur. The focused of this case study is the construction and maintenance of in-lane sidewalk station. The study is carried out by observation done on the site. According to the observation, the bus stop is rebuilt when there is a lot of damage and flaws in the region and the maintenance is done in just minimal damage.

The case study includes in calculating and estimating the amount of materials and cost for each item and machine required. The calculation and estimating is done by analysing the types of each types of item such as size of brc used and the grade of the concrete for this type of design.

The implementation of the study is to observe the method of constructing in-lane sidewalk design. This will allow more understanding on how one work is done on the site.

1.4 Method of Study

This case study was carried out utilising a variety of methods including observation, analysis and recording of the data gathered. Each task completed on site is documented for the purpose of reporting work in progress or completed.

The first method involves inspecting each bus stop unit for damage, determining the cause and how to carried out the process of constructing. This observation is carried out during the site visit. The damage will subsequently be reported in the given checklist. After that, take measurements and record the data for each item that has to be fix. Furthermore, proof such as images of the damage and work done is taken for reference.

This study also was carried out by using standard operating procedures given by the company, clients and building law. The study also used any relevant company's work reports as reference in order to comprehend the case study conducted.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Company's introduction

Wakriz Engineering Sdn Bhd is a construction and cleaning firm based in Peninsular Malaysia. The company is registered under *Syarikat Suruhanjaya Malaysia (SSM)* and based in Wangsa Maju, Kuala Lumpur.

The primary goal of Wakriz Engineering Sdn Bhd is to provide services as a globally competitive cleaning and construction contractor. The company also provides the best service to the clients and has expert workforce as well as a systematic administrative system. This company conducts a cleaning or construction project either in building or infrastructure with the goals of achieving the highest level of 'best value for money'.

In addition, this company has their own experienced and qualified technical team as well as its own partners who will handle a project. Furthermore, the company's team is knowledgeable in construction economics and contractual issues for various types of projects. This enables the company to provide professional services to clients particularly in the field of construction costs which is that every client requires before implementing the project. All employees are valuable asset to the company. Therefore, the company team constantly striving to develop skills and knowledge in order to provide better services to all parties.

2.2 Company's Profile

Company's name : Wakriz Engineering Sdn Bhd

Company Website : www.mhco.com.my

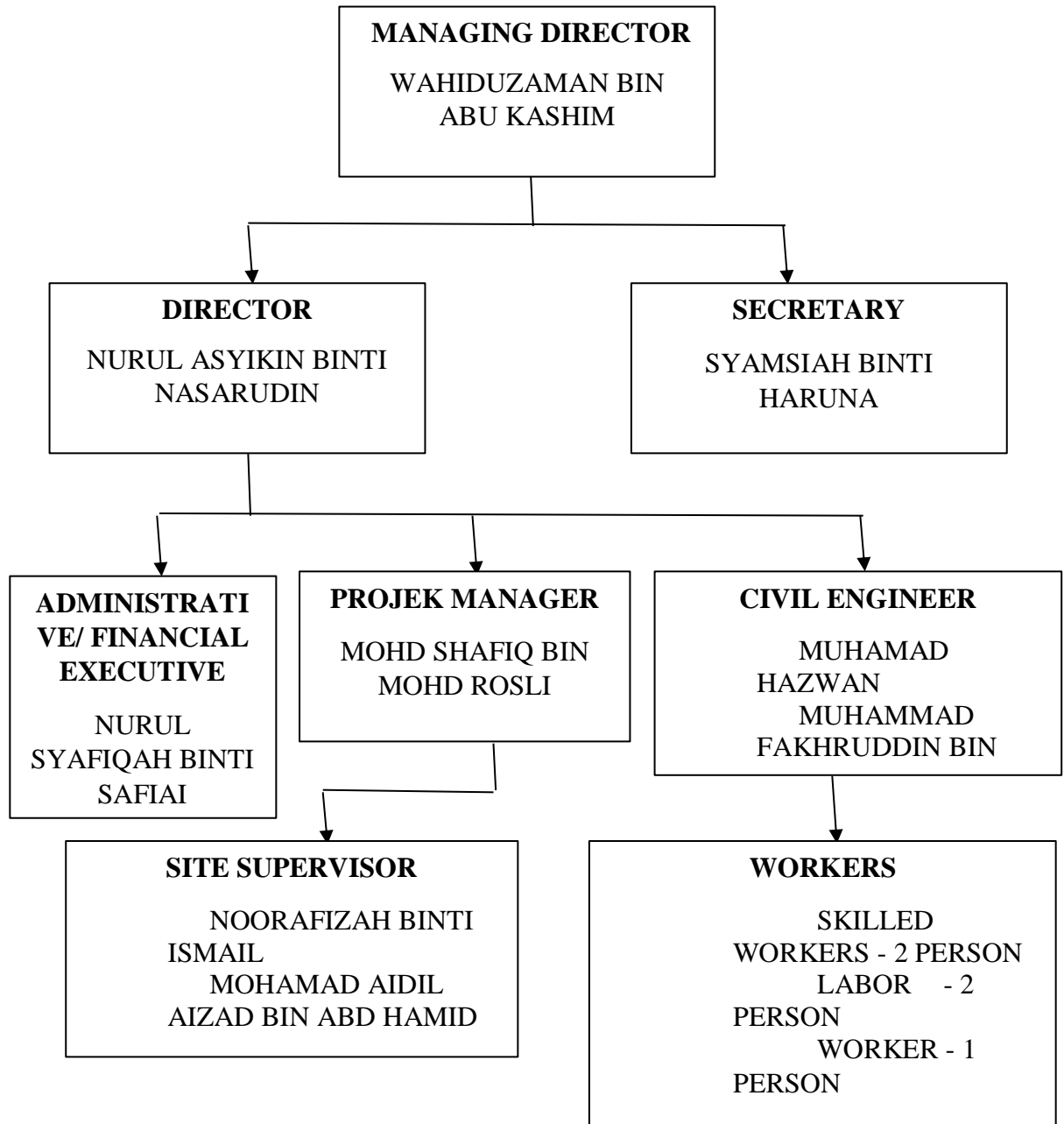
Mission Statement : conducts a cleaning or construction project either in building or infrastructure with the goals of achieving the highest level of 'best value for money'.

Scope of Services :

1. Building and Office Cleaning
 - Provides indoor and outdoor cleaning services as well as office cleaning.
2. Cleaning Service
 - Provides cleaning services in crop areas, landscapes and rivers according to the clients.
3. Hauling garbage
 - Assist client who are having difficulty disposing of garbage on construction sites, buildings residences and so on.
4. Plantation and Horticulture
 - Provides clients in ordering or service works in crops, breeds and seedling of tree.
 - Provides agricultural equipment and supplies
5. Public infrastructure / facilities
 - Provide public services to customers through the provision of public equipment and facilities
6. Construction
 - Provides construction and maintenance according to the client needs such as building and infrastructure

2.3 Company Organisation Chart

WAKRIZ ENGINEERING SDN BHD (1125519-V)



Wakriz Engineering Sdn Bhd's organisation is depicted in the chart above. The company is held by Encik Wahiduzaman bin Abu Kashim as the managing director and Puan Nurul Asyikin binti Nasarudin as the director. The company is assisted by a secretary, Puan Samsiah binti Haruna. The chart followed by Nur Syafiqah binti Safiai as financial executive and administrative. Encik Mohd Shafiq bin Mohd Rosli as the project manager and followed by site supervisor Puan Noorafizah binti Ismail and Encik Mohamad Aidil Aizad bin Abd Hamid. Encik Muhamad Hazwan and Encik Muhammad Fakhruddin bin Norazam as the civil engineer. Lastly followed by five site workers.

2.4 List of Projects

2.4.1 Completed Projects

No.	Project Title	Project Value (RM)	Start Date	Completion Date	Project Duration	Client
1	C-055A, Voting Work – Upgrading Kepong Indah Playground	199,399.00	1.6.2020	30.9.2020	3 months	DBKL

Table 1: List of completed project

2.4.1 Project in Progress

No.	Project Title	Project Value (RM)	Start Date	Completion Date	Project Duration	Client
1	A-118, Children's Playground Maintenance & Upgrading Work	1,000,000.00	21.1.2020	20.1.2022	1 year	DBKL
2	A-118, Children's Playground Maintenance & Upgrading Work	1,000,000.00	21.1.2020	20.1.2022	1 year	DBKL
3	A-017, Public Infrastructure Road and Drainage Maintenance Works.	2,000,000.00	10.9.2020	9.9.2022	11 months	DBKL
4	A-099, Public Infrastructure, Road and Drainage	1,000,000.00	15.2.2021	14.2.2023	2 years	DBKL

	Maintenance Work in PA & PPR (Pothole)					
5	A-150, Foot-Overbridge Maintenance Work	1,500,000.00	1.4.2021	31.3.2023	1 year 11 months	DBKL
6	A-017, Maintenance Work of Public Infrastructure, Roads and Drainage.	2,000,000.00	10.9.2020	9.9.2022	11 months	DBKL
7	A-149, Maintenance Work of Bus and Taxi stop.	1,500,000.00	1.4.2021	31.3.2023	1 year 11 months	DBKL
8	A-149, Maintenance Work of Bus and Taxi stop.	1,500,000.00	1.4.2021	31.3.2023	1 year 11 months	DBKL
9	A-149, Maintenance Work of Bus and Taxi stop.	1,500,000.00	1.4.2021	31.3.2023	1 year 11 months	DBKL

Table 2: List of ongoing projects.

CHAPTER 3.0

CONSTRUCTION AND MAINTENANCE OF PUBLIC FACILITIES:

BUS STOP

3.1 Introduction to Case Study

This case study is focusing in constructing and maintaining each bus stop unit around Taman Wilayah, Kuala Lumpur. Then contract value of this project is RM 1,500,000.00 and carried out for 45 days from 1st of September until 15th October 2021. There are nine units of bus stop that need to be rebuilt and maintain. This project is directed under Dewan Bandaraya Kuala Lumpur (DBKL) to ensure and maintaining the public facilities for use by the local community.

The work performed is site clearance work prior to building and repairs. Demolishing tiles and excavate existing kerbs is done in the site clearing process. Concrete works such as mixing and pouring cement according to specification was also completed on the site. In addition, there is painting, roof installation, and rubbish transportation on at the site.

3.2 Preparation of Bill of Quantities.

A bill of quantities is a thorough declaration of work, costs, measurements and other data for the contractual erection of a structure. The prices of each bus stop unit in this study vary based on the breadth of improvements completed at each site. The greater the overall estimated cost per bus stop unit, the more labour and supplies are necessary.

The first step on creating bill of quantities or bq is set up a spread sheet. Then, check the checklist scope of work that had been done on the site and prepare the list of materials and measurements of each item from the DBKL's price rate. After that, break down the project into specific section according to the item. Lastly, calculate the size of the area and the amount of material required.

BUS STOP 1 (BERHADAPAN KEDAI GAMBAR FOTO B)

No.	Description	Item	Unit	Quantity	Rate (RM)	Total (RM)
SITE CLEARANCE						
1	Memotong, memecah dan membersihkan segala ubinan dan skrid dan ratakan semula serta ada kan jalur-jalur potongan untuk menerima yang baru di permukaan konkrit termasuk kerja-kerja membuang sampah dan sisa-sisa konkrit ke tempat yang dibenarkan.	8.2.2	m2	73.26	25.75	1,886.45
2	Excavate to and break up existing kerbs, kerb outlet and channel block including concrete foundation and haunching get out and remove all debris from site as directed.	30.1	m	27.00	12.75	344.25
3	Memecah atau membuang konkrit bertetulang yang sedia ada dan membaiki mana-mana bahagian yang termusnah ke tapak yang diarahkan.	3.2	m3	2.67	191.40	510.85
4	Menyediakan peralatan, mesin dan pekerja untuk membuka, menanggal serta membuang bumbung sedia ada daripada jenis Metal deck atau polycarbonate dan mengangkut keluar ke kawasan yang diluluskan S.O.	13.3.1	m2	20.35	33.00	671.55
KERBING WORKS						
5	Membekal bahan dan peralatan bagi membuka dan memasang kerb biasa/outlet mengikut profil jalan sedia ada atau seperti diarahkan (konkrit gred 30)					
	a) MI Kerb	12.1 (a)	m	27.00	48.30	1,304.10
CONCRETE WORKS						
6	Acuan konkrit kepada semua struktur konkrit yang diperlukan seperti diarahkan.	5.1	m2	12.20	49.70	606.34
7	Membekal dan memasang tetulang besi fabrik (BRC) termasuk kerja-kerja memotong, membengkok, mengikat dan meletakkan ke posisi yang kukuh					
	b) Saiz A10	17.14 (b)	m2	73.26	27.70	2,029.30
8	Kerja-kerja membekal, menuang, memadat Konkrit mix 1:2:4 (gred 25) ke tapak seperti yang dinyatakan di dalam spesifikasi.	2.1.2	m3	14.78	303.00	4,477.43
9	Simen plaster biasa (1:3) untuk permukaan dinding setebal 20mm pada struktur dinding baru dan sedia ada.	8.10	m2	2.00	25.75	51.50
Summary Page 1					Total (RM)	11,881.76

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Figure 1 shows the bill of quantities for this study.

JABATAN PENGANGKUTAN BANDAR
DEWAN BANDARAYA KUALA LUMPUR
JADUAL KADAR HARGA

KERJA-KERJA PENYELENGGARAAN KE ATAS HENTIAN BAS DAN TEKSI BERBUMBUNG DI WILAYAH
 PERSEKUTUAN, KUALA LUMPUR UNTUK TEMPOH 24 BULAN

3.3

Kod	Lokasi, Keterangan Kerja & Maklumat Bahan-Bahan	Unit	Harga (RM)
i	S.O/Staff Equipment and Facilities The Contractor shall provide and maintain the following for the use of SO and his staff from the commencement of the Contract, as specified : a. 1 no. Distometer b. 1 no. Roller measurement and steel tape c. 1 no. waterproof digital camera	L.sum	3,500.00
ii	The Contractor shall provide all Personal Protective Equipment required for the use of S.O and his supervisory staff complete as specified: a. 4 nos of safety helmet b. 4 pairs of safety boots c. 4 nos of safety vest d. 4 pairs of raincoat	L.sum	2,500.00
1.00	KERJA KOREKAN Menggali tanah hendaklah mengikut ukuran tepat yang dikehendaki sahaja. Sekiranya digali lebih daripada yang dikehendaki, kontraktor mestilah menimbus kembali dengan tanah, batu atau konkrit dengan tidak mendapat sebarang bayaran tambahan. Harga menggali tanah adalah termasuk harga membersihkan kawasan yang hendak digali, menimbus serta memadatkan tanah ke dalam lubang dan membuang tanah yang berlebihan dan meratakannya di tempat yang dikehendaki. Harga menggali juga adalah termasuk harga mengeluarkan air yang bertakung misalnya air hujan atau lumpur dengan cara menimba atau mengepam serta menupang tebing parit dengan papan dan kayu.		
1.10	KERJA KOREKAN UNTUK ASAS		
1.1.1	Menggali tanah untuk tapak konkrit tidak melebihi 1000mm dalam (menggunakan cangkul)	M3	93.00
1.1.2	Menggali tanah untuk tapak konkrit tidak melebihi 1000mm dalam (menggunakan jentera)	M3	74.50
1.1.3	Menggali tanah untuk tapak konkrit tidak melebihi 1000mm dalam, tidak melebihi 3000mm dalam (menggunakan jentera)	M3	93.00

Determine The Defect to Existing Facilities.

1. Efflorescence.

The formation of salt deposits on the concrete surface is referred as efflorescence. The colour of formed salts is often white. It is caused by the presence of soluble salts in the water used in the concrete mix. When the concrete hardens, these soluble salts are lifted to the top surface by hydrostatic pressure and salts deposits accumulate on the surface after complete drying. The pictures below show the efflorescence on the site.



Efflorescence

2. Mould on Concrete Stump.

Condensation can form on the cool surface of a concrete wall when the temperature drops. This increased surface moisture eventually generates an environment suitable to mould growth. Mould development on concrete caused by dampness is often broad and widespread.



Mould

Figure SEQ Figure * ARABIC 4 shows the mould growth on the stump's surface.

3. Cracking Finishes Tiles.

Cracking floor tiles were discovered is one of the problems when examining the site. An uneven surface caused by extensive tree root growth is a major cause of the tile finish cracking. Tile flaws occur as a result of faulty installation techniques or materials that are not suited for the tile surface.



4. Blistering and Peeling Paint.

Blistering and peeling are flaws caused by expansion of the paint film. The swelling is caused by the creation of an air bubble beneath the paint film as a result of the presence of moisture, oil or grease.



5. Faded Painting.

Faded paint occurs when the surface is exposed to sunshine and begins to fade faster than intended. The sun's high quantities of ultraviolet (UV) radiation have a significant impact on paint pigments, making them susceptible to variety of painting issues, including fading. Second, a quick shift in temperature is a significant role in fading too. The higher the temperature fluctuations that surround a kerb surface, the greater the stress on the paint system, which accelerates the paint breakdown.



Faded Painting

3.4 Method of Construction and Maintenance.

1. Site clearance.

First, excavate and break up the existing kerbs, then install new kerbs in their place. Then, cut, break and clean all tiles before re-levelling the floor according to the broom finish requirements. Finally, existing unreinforced concrete such as stumps need to be dismantled or disposed of.



Stumps had been removed

2. Concrete works.

After all the tiles had been removed, the installation of steel reinforcement (BRC) and pouring and compacting of concrete mix 1:2:4 (grade 25) are completed in accordance with specification. Then, poured 30mm cement and sand (1:3) screed over the concrete with a broom finish.



3. Painting works.

Scraped the paint on fascia board, wooden, kerb and steel structures. After that, wash, paste the cracked areas, and putty to prepare for new paint. On plastered surfaces, wood, and metal, apply one coat of cement-based paint (undercoat). Then dab a layer of 'primer' red oxide or chromate over the iron's surface. Apply two coats of 'weather shield' type exterior mixture paint on the plastered surface, followed by two coats of 'gloss' on wood and metal surfaces.



Figure 12 shows the worker is painting the kerbs.

4. Roof structure maintenance.

Demolished the roof structure section and rebuilt with the new metal deck SWG 30 type of roof and rafters. Then, install the new fascia board with the size of 25mm x 200mm.



Figure 13 shows the demolishing of roof structure.

CHAPTER 4.0

CONCLUSION

Public facilities are important to be maintain as the rapid development of public transportation such as busses and taxi. This also to make sure the user's comfortability. There are three types of bus stop designs. One of three design is used in this case study project which is in-lane sidewalk stops. This design is easier to be built and has a low cost of maintenance. The construction of one unit of bus stop also include the documentation such as bill of quantities. This is to ensure the costs of the construction is between the estimating. Lastly, all the method in this case study is observed during the site visit and all the data is recorded and explained in the method study.

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